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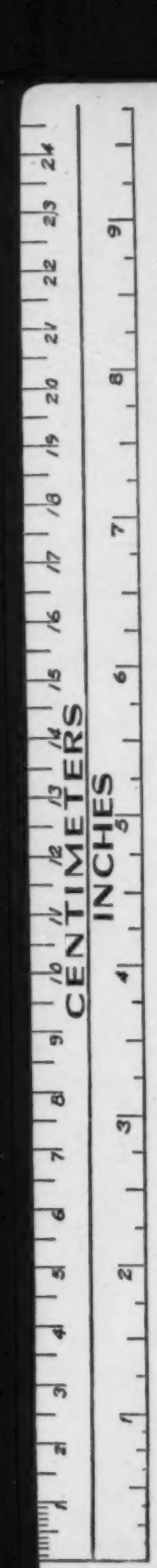

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AMERICAN ANTIQUITY

VOL. XXII JANUARY, 1957 No. 3

TO THE MEMBERS OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY

Your expression of confidence in electing me to the presidency of the Society for American Archaeology is much appreciated. I assure you of the devotion of my best efforts on your behalf for the continuing prosperity of the Society.

As you will recall, the ballot for the annual election of officers for 1956, on which my name appeared, also carried 3 constitutional amendments, Numbers 2 and 3 of which provided for the Executive Committee to determine the amount of annual dues of active members and the cost of institutional subscriptions to AMERICAN ANTIQUITY. Both of these amendments, indeed, all three, were adopted by vote of the membership at large.

Thus with your sanction, the Executive Committee at the 1956 annual meeting of the Society, reported in the October, 1956, issue, decided, with some reluctance, to increase dues and subscription rates from the prevailing $6.00 to $8.00 a year. Justification for their decision is to be found in the publication activity of the Society, probably its most important single function.

With rising printing prices, the publishing costs of our journal and memoir series have for several years equaled or surpassed the income from dues, the deficiency having been met by charging authors heavily for both illustrations and reprints. Moreover, the issuance of the memoirs has been dependent upon especially solicited grants for specific numbers.

AMERICAN ANTIQUITY, reflecting the expansion of interests and activity in archaeology, has continued to increase in size from less than 400 pages a year a few years ago, to over 450 pages in 1955-56. This trend promises to continue into the future. Memoir manuscripts, too, are accumulating for lack of available money. For example, the papers resulting from the important conference on the Archaic cultures, held at the annual meeting of the Society in 1955, are scheduled to appear in this series, when funds are obtainable.

The increase in dues will also benefit the Publication Fund indirectly by curtailing the draft upon it for funds to meet current expenses of the Society, such as postage and meeting charges, and by allowing the income from sales of back issues of AMERICAN ANTIQUITY and the memoirs to revert entirely to publication purposes.

These are only some of the obvious reasons for and advantages accruing from the unfortunate necessity of raising the dues at this time. The Executive Committee and officers of the Society believe, from your response to the aforementioned amendments and your other manifestations of interest and support in your Society, that you will concur with their decision.

WILLIAM A. RITCHIE, *President*

MOMÍL: A FORMATIVE SEQUENCE FROM THE SINÚ VALLEY, COLOMBIA

GERARDO REICHEL-DOLMATOFF*

EARLY in 1954 the author and his wife were stationed by the Instituto Colombiano de Antropología at Cartagena, on the Caribbean coast of Colombia. This provided the opportunity to continue their program of archaeological research on the Colombian coastal area which, at an earlier date, had already led to the formulation of a tentative time and space framework (Reichel-Dolmatoff 1954). While during most of 1954 a survey of the area surrounding Cartagena was made (Dussán de Reichel 1954; Reichel-Dolmatoff 1955), the dry season of 1954-1955 was spent in making a reconnaissance of the Sinú Valley, southwest of Cartagena. During a 4-month trip excavations were carried out at 2 major sites and extensive surface collections were gathered from some 20 others.

Near Momíl, a small village situated on the borders of a large lagoon covering the region between the lower courses of the 2 main channels of the Sinú River, a deep midden site was excavated which yielded a long sequence of Formative materials. As the publication of the complete report on this excavation may be delayed for some time to come, and since the sequence recovered in it should prove of interest to many colleagues working on problems of cultural origins and interrelationships in Nuclear America, it seems justified to present here a brief synopsis of the principal results of this work.

The Sinú Area. The valley of the Sinú River represents the principal structural depression between the lower Magdalena and the Gulf of Urabá (Parsons 1952), in the northwestern corner of the Republic of Colombia. The wide alluvial plain of the lower course of the river is sparsely dotted by residual Tertiary hills covered with a shrubby vegetation, while most of the surrounding low country is pasture. The tropical climate of the region is hot and humid, being characterized by a mean temperature of 28°C. and an average annual precipitation of at least 40 inches. The dry season begins late in December and lasts through March, being followed by heavy rainfall from April to May, and again from September to November. During the rainy season great extensions of the flood plain are inundated and often severe damage is done to settlements and roads. It is evident that the periodic flooding has been accelerated during historic times by deforestation, but it is not improbable that a strong biological pressure has been exercised upon this general area since early prehistoric times. The abundance, depth, and relative age of archaeological deposits seem to indicate that the Sinú Valley represents an old cultural habitat having been occupied for several thousand years.

At the beginning of the 16th century the Spaniards found the Sinú Valley densely populated by warlike Indians who, according to the accounts of the early chroniclers, represented a culture of essentially Circumcaribbean type. Through the discovery and systematic looting of hundreds of burial mounds containing a wealth of gold objects, the Sinú soon acquired legendary fame which has lasted up to the present. However, no archaeologist had visited the valley and the few isolated museum specimens of Sinú pottery illustrated in general reports are probably late and hardly representative of the cultural history of this region.

The Momíl Site. Approximately 2 km. northeast of Momíl, a low narrow hogback ridge protrudes southward into the lagoon. At this point the Aguas Prietas channel, a heavily silted branch of the main river, approaches from the South, running first parallel to the ridge on its west side, turning then toward Momíl whence it continues its course in a westerly direction to Lorica where it joins the main channel. Between this silted-up channel, surrounded by swamps, and the foot of the ridge, there lies a flat, narrow strip of land, some 300 m. long by 100 m. wide, covered by shrubs and pastures and partly planted with coconut palms and plantains. The surface of this strip of land, which lies several meters

* The author is greatly indebted to Gordon R. Willey of the Peabody Museum, Harvard University, who kindly read the manuscript and made several valuable suggestions.

above the level of the flood plain, forming a flat terrace limited toward the lagoon by a short barranco 80 cm. high, was found to be covered with potsherds. Several test pits proved that cultural remains were very dense and varied, reaching considerable depth and being deposited in horizontal layers. Two straticuts and a number of small pits revealed that the entire extension between the foot of the ridge and the border of the lagoon was formed by a thick deposit of occupational debris, reaching a depth of 3.30 m., at which culturally sterile residual clay was found. Excavation was carried out by arbitrary levels each 25 cm. deep, the natural stratification not being clearly discernible during actual digging. Culture-bearing deposits were found to be very concentrated, yielding a great abundance of potsherds, miscellaneous objects of clay, as well as artifacts of stone, bone, and shell. The character of these remains suggest an accumulation of occupational refuse deposited in and around a village area. It is evident that after its final abandonment, the site was used as a burial ground by aborigines of a very different culture type than the one represented by the midden. This later group buried a number of funeral urns accompanied by pottery vessels and other artifacts, thus disturbing in part the upper layers of the refuse-bearing deposits but fortunately not affecting the deeper layers and their important stratification. The total number of sherds excavated in both cuts reaches about 350,000, and in addition a great number of other artifacts was found.

On the basis of the physical characteristics of the matrix and of vertical quantitative and qualitative distribution of pottery wares, decorative techniques, and other criteria, the cultural content was broken down into 2 major periods designated here as Momíl I and Momíl II. Taking into account a series of particular physical and typological factors, Momíl I was further subdivided into several smaller developmental units termed phases and designated here as Momíl Ia to Id. Physically the 2 main periods are divided by an 8 cm.-thick layer of sandy soil eroded from the ridge which, although containing cultural remains, forms a clear dividing line. The subdivision of the earlier period was arrived at mainly by correlating minor physical characteristics with stylistic elements and the presence or absence of certain traits within the cultural content of the strata thus established.

The Sequence. Both the physical superposition as well as the changes in vertical distribution of the cultural remains, indicate a developmental sequence with a major break at about half the depth of the deposit. Two ware types, Momíl Plain Gray and Momíl Plain Red, both belonging to culinary vessels, occur in both periods but a cream colored subtype of the former is quite characteristic of Momíl I, as is a well-polished black ware. Due to the fragmentary nature of the material, sherds were classified mainly in accordance with decorative techniques and more than 30 types were thus established, the temporal distribution of which showed marked changes.

Characteristic vessel shapes of Momíl I include subglobular and globular ollas with restricted necks and wide everted rims; hemispherical bowls with straight rims; several types of composite silhouette bowls with a marked peripheral angle, some with an in-out-turning rim; round-bottomed short-necked globular jars with flaring rims turned down at an angle; very large flat dishes with a thick raised rim; small flat griddles; small pottery stands (?); and slightly concave dishes with broad out-flaring thickened rims. A type found only in Momíl Ia to Ib consists of a hemispherical bowl, the interior of which is divided by a vertical wall, thus forming 2 semicircular compartments.

Some vessel shapes of Momíl II carry on the earlier tradition, such as hemispherical bowls and low composite silhouette bowls with inturned rims, but there also appear a number of new vessel shapes. Very characteristic are large-sized subglobular to globular storage vessels of coarse undecorated gray ware, with a very thick rim; pear-shaped vessels with outturned rims, and round-bottomed short-necked jars with flaring rims, the latter of thin-walled ware. Some shapes characteristic of Momíl II which are of particular interest are round-bottomed basal-flanged bowls, the introduction of which coincides with the very beginning of this period; tripod vessels with tall solid supports; ovate (?) bowls; and small low bowls with long conical basal spikes. Hemispherical bowls in

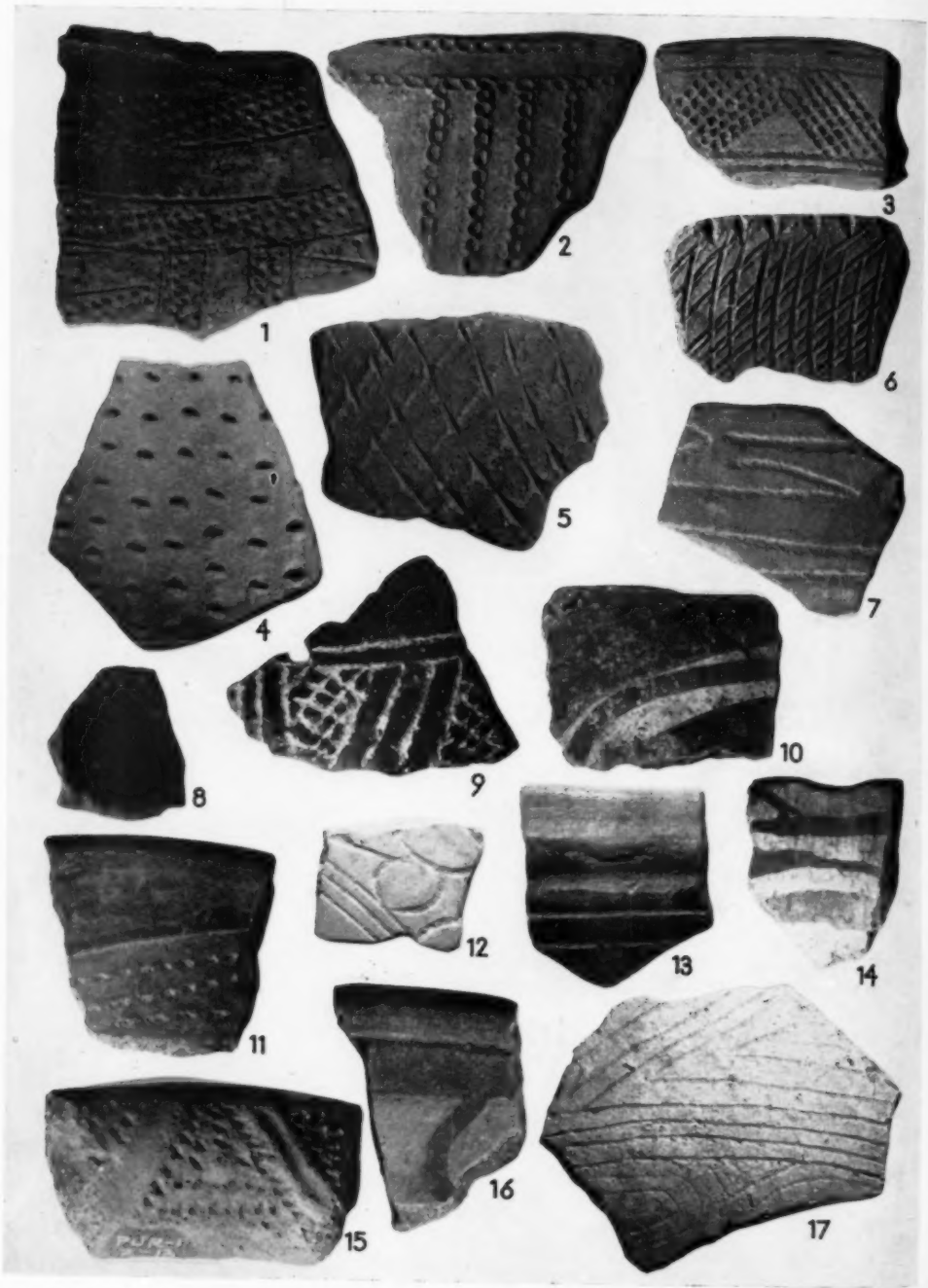

FIG. 1. Pottery types of Momil. *1-3*, rocker stamped; *4*, stippled; *5*, grooved-raked; *6*, crosshatched; *7*, engraved; *8*, black-on-red resist dye; *9*, black incised with white fill; *10*, black-on-white; *11*, red-zoned incised dentate; *12*, curvilinear incised; *13*, grooved; *14*, polychrome; *15*, grooved punctate; *16*, black-on-red; *17*, fine incised.

FIG. 2. Momil pottery types and miscellaneous objects. *1*, interior of plate with zoned dentate stamping; *2*, irregular clay pellets; *3-9*, implements of flint; *10*, "candelero"; *11*, figurine from Period I; *12*, tubular spout; *13*, figurine from Period II; *14*, figurine head from Period II; *15*, figurine from Period I; *16*, flat stamp; *17*, cylindrical stamp.

Momíl II show considerable variety in size, decoration, and surface treatment.

Annular bases are present in both periods, but handles are completely lacking, and only in Momíl II there appear occasionally small solid lugs attached to the periphery of some bowl-shaped vessels. Low conical feet are characteristic of Momíl I, while both solid and hollow mammiform supports appear simultaneously only in Momíl II. In all cases it is doubtful whether these supports formed parts of tetrapod or tripod vessels. Diminutive vessels with solid tetrapod supports were found only in Momíl Ia to Ib, and other diminutive forms such as small canoe-shaped vessels, "candelero"-type objects, and incense-spoons (?) are frequent in Momíl I. In Momíl II there occur diminutive tripods and tiny modeled bowls. Several fragments of what seem to be simple unbridged spouts were found in Momíl Ic and Id. A few sherds of deeply vertically grooved vessels come from Momíl Ia.

As to decorative techniques, it can be said that incised wares predominate throughout all levels. Dentate roulette rocker stamping is very common and occurs with certain stylistic modifications in both periods. Incised wares include broad-shallow line incision, fine-line incision, and parallel grooving with crosswise raked lines. All decoration is prefiring but there is evidence of prepolish incising in Momíl II. Cursive curvilinear elements appear late in Momíl II, being infrequent in the earlier period. There are 2 types of crosshatched decoration, a rather fine crosshatch fill of rectangular, triangular, or semicircular zones on black wares in Momíl I, and crude, deep crosshatching without zoning in Momíl II, on reddish or gray culinary wares. Broad-shallow grooving occurs on wide everted rims in Momíl I in combination with crude punctate patterns, while in Momíl II it is combined with dentate stamping or curvilinear incising on small well-polished bowls. Red-zoned incised or dentate-stamped sherds with color areas set off by incision are relatively rare but do occur in Momíl II. Zoned rocker stamping with incised outlines is very frequent in Momíl I. Stippled wares are diagnostic of Momíl I, as are appliqué strips with spaced depressions forming a chain pattern, or rows of small flattened pellets stuck to the surface. Prefiring post-slip engraving in a well-dried surface occurs only in Momíl II. A very frequent trait of Momíl I incised or roulette-stamped black ware is a white pigment filling, while a red filling is found on a few broad-line incised or grooved sherds in Momíl II.

As to slipped wares, the earliest example is a creamish, almost yellow, slip found exclusively in Phase Ia. Red-slipped vessels appear first in Phase Ib and develop mainly in Ic and Id, disappearing in the lower part of Momíl II, while white-slipped wares are characteristic of Momíl II.

Bichrome painting (black-on-white, black-on-red) begins in Phase Ic, reaching its highest development in the middle layers of Momíl II and disappearing in the upper levels. A red-on-white type appears slightly earlier, in Phase Ib, and disappears somewhat before the 2 above mentioned types. A few intrusive (?) white-on-red sherds were recovered in Phase Ic. Also in Phase Ic polychrome painting (black- and red-on-white) begins and develops mainly in the lower part of Momíl II, disappearing in the upper levels. Both bichrome and polychrome decoration is found mainly on the inside of flat plates or the upper outside of straight-walled flaring bowls, and on some composite silhouette vessels. Plates are generally decorated with parallel circular bands of different colors, while other vessel shapes show simple motifs of wavy or spiral elements. An interlocking motif appears in Phases Ic and Id on black-on-white ware.

Two types of resist-dye decoration were recognized. The first occurs only in Momíl I, beginning in Phase Ib and consists of irregular, badly faded grayish lines and blotches on red ware composite silhouette bowls. This type is not well defined. The second type occurs exclusively in the middle layers of Momíl II and shows a clearly defined black-on-red Quimbaya technique.

Hand-modeled human figurines are very characteristic. In Momíl I they are solid, crescent based, with handle-shaped arms and very broad, flat, almost featureless heads. The material is cream-colored unslipped clay. Throughout this period hardly any stylistic changes are noticeable although there appear a few standing specimens, some others with traces of facial paint, and several hunchbacked figurines with serrated vertebrae. Several of the standing

figurines show what has been termed a "cleft foot." In Momíl II there is an abrupt change. Practically all figurines are hollow and manufactured of red clay. Some are seated, having bulbous, hollow lower extremities; others are standing on thin, solid, S-curved legs. Most have appliqué bracelets and necklaces.

Besides figurines, of which some 1700 fragments were recovered, there appear a great number of miscellaneous objects of clay. A flat stamp was found in Phase Ia and several hundred fragments of hollow cylindrical stamps with positive carved designs were found in Momíl II. Zoomorphic whistles, first rather crudely shaped but later well modeled, are typical for Momíl II, but absent in Momíl I. Bar-shaped clay pendants, black-ware pottery rattles with solid cylindrical handles, and well-polished unperforated discs with a complex design engraved upon one face only, are all diagnostic of Momíl I. A double-faced adorno suggesting a concept of dualism comes from the bottom level of Momíl II. Spherical spindle whorls were found in the upper levels of the same period. Biomorphic modeled adornos, some of them representing bird heads, are frequent in Momíl II but lacking in Momíl I.

Objects of stone are abundant in both periods. Momíl I is characterized by a flint industry with both percussion and pressure flaking present. No nuclear tools were found but several nuclei with prepared striking platforms were observed. Simple, preconventional cortical tools, end and side scrapers, and microlithic points are common, the latter having an approximately hexagonal or rectangular cross section, with secondary retouching along the edges. Many of them have diminutive stems and the entire objects measure about half an inch or less. Some are quite reminiscent of certain Jaketown microliths (Ford, Phillips, and Haag 1955). Abrading and polishing tools of sandstone or calcareous material appear with many different shapes. Pebble tools, hammerstones, or miscellaneous polished and flaked fragments are common in both periods, but flat or trough-shaped metates and manos appear only from the bottom of Momíl II upwards. Smooth ovoid quartzite pebbles for burnishing pottery are frequent in Momíl II and simple polished axes of Neolithic type occur throughout the sequence.

Objects of shell are represented among others by *Strombus* picks, cups, spoons, buttons, *Oliva* tinklers, and *Venus* shells with a perforated apex. The characteristic technique employed in the manufacture of these implements was sawing halfway through the thick outer wall of the shell and then breaking off the piece before further modification.

A number of bone awls, eyeless needles, antler tools, discs, and miscellaneous bone fragments with cuts, perforations, or polished surfaces were found in both periods. A beautifully carved monkey, 1½ inches high, was found in Phase Ib and a dentate rocker stamp of turtle shell came from nearby. Several highly polished pieces of the shell of a large sea turtle might have been used as a mirror.

A late, secondary burial complex, imbedded in the upper levels of Momíl II, is represented by urns and a number of smaller vessels and other artifacts accompanying the burials. Each urn contained a single skeleton, the skull being set outside the vessel. It is obvious that these burials were made by a people of a very different cultural tradition. Vessel shapes include low cups with high conical-truncated supports, grater bowls with deeply incised cobweb designs and low ring-based bowls with recurved rims, decoration being limited to a series of notches on the rounded lip. Many vessels were found covered with small, slightly concave lids. Discoidal spindle whorls of turtle shell or bone, several well-polished axes, and many fine zoomorphic shell carvings were found associated with the burials.

Throughout the whole sequence thousands of fragments of turtle shell, mammal bones, and fish remains were found. Sea and freshwater mollusks seem to have been used only for purposes of manufacturing tools or ornaments, not as food. No hearths, charcoal, or ash lenses were observed although diminutive particles of coal were present in most strata. A strong lime accretion was noted in the bottom levels of Momíl I and the middle levels of Momíl II; this was absent in the other strata.

The temporal distribution of a number of selected traits is given in Table 1, according to level, period, and phase. It should be pointed out that Level 7 evidently represents a mixed strata of Momíl I and II elements, contained in the sandy soil layer mentioned above.

TABLE 1. TEMPORAL DISTRIBUTIONS OF SELECTED TRAITS

	I							II					
	a		b		c		d						
	13	12	11	10	9	8	7	6	5	4	3	2	1
Ovate bowls											X	X	X
Spherical spindle whorls											X	X	
Red pigment filling										X	X	X	
Metates and manos								X	X	X	X	X	X
Mammiform supports								X	X	X	X	X	X
Tall solid tripods								X	X	X	X	X	X
Basal-flanged bowls								X	X	X	X		
Resist-dye type B								X	X	X	X		
Incised-punctate								X	X	X			
Red-zoned incised								X	X	X			
Basal-spiked bowls								X	X	X			
Concept of dualism								X					
Zoomorphic whistles							X	X	X	X	X	X	X
Cylindrical stamps							X	X	X	X	X	X	X
Hollow figurines							X	X	X	X	X	X	X
White-slipped ware							X	X	X	X	X	X	
Coarse crosshatching							X	X	X	X	X	X	
Tubular spouts (?)						X	X						
Polychrome ware					X	X	X	X	X	X	X	X	
Black-on-red ware					X	X	X	X	X	X	X	X	
Black-on-white ware					X	X	X	X	X	X	X		
Hunchbacked figurines					X	X	X						
Interlocking design					X	X	X						
Red-on-white ware			X	X	X	X	X	X	X	X			
Red-slipped ware			X	X	X	X	X	X	X				
Stippled ware			X	X	X	X	X						
Resist-dye type A			X	X	X	X	X						
Diminutive canoes		X	X	X	X								
Turtle shell mirrors (?)		X	X	X									
Flat stamps		X											
Vertically grooved vessels		X											
Cream-slipped ware	X												
Manioc (?) roasting dishes	X	X	X	X	X								
"Candeleros"	X	X	X	X	X	X							
Solid figurines	X	X	X	X	X	X							
White pigment filling	X	X	X	X	X	X							
Z-shaped decorated rim	X	X	X	X	X	X	X						
Peduncular supports	X	X	X	X	X	X	X						
Fine crosshatching	X	X	X	X	X	X	X						
Flint industry	X	X	X	X	X	X	X						
Small flat griddles	X	X	X	X	X	X	X						
Black incised wares	X	X	X	X	X	X	X	X					
Black dentate stamped ware	X	X	X	X	X	X	X	X					
Diminutive tetrapods	X	X	X	X									
Composite silhouette bowls	X	X	X	X	X	X	X	X	X	X	X	X	
Dentate zoned stamping	X	X	X	X	X	X	X	X	X	X	X	X	X
Grooved raked decoration	X	X	X	X	X	X	X	X	X	X	X	X	X
Incised decoration	X	X	X	X	X	X	X	X	X	X	X	X	X
Hemispherical bowls	X	X	X	X	X	X	X	X	X	X	X	X	X
Annular supports	X	X	X	X	X	X	X	X	X	X	X	X	X

Summary. Ever since Strong (1943) and Steward (1949) first suggested a common foundation for the more advanced civilizations of Nuclear America, many new and important data have been contributed toward this theory from both Middle America and Peru. This growing information has been incorporated lately into a series of formulations tending to prove beyond reasonable doubt the existence of such an early basic culture (Willey 1955a, 1955b). However, comparisons of traits and complexes have had to be made, so far, almost exclusively between Mesoamerica and the Central Andes, due to the general lack of archaeological research in the intermediate area, at least as far as the earlier developments were concerned. Consequently these correlations had to bridge the wide gap between the Ulua drainage in Honduras and the northernmost manifestations of the Chavín horizon without any concrete points of reference in the intervening area, except for the San Agustín culture which offered an occasional but precarious point of comparison. Only in recent years traces of a formative culture stage were discovered in Panama (Willey and McGimsey 1954) and northern Colombia (Reichel-Dolmatoff 1954; 1955) but in none of these instances was there found a complete and varied sequence.

The Momíl site provides the first clear-cut evidence for a Formative stage in Colombia. The variety and length of its sequence may eventually come to represent an important fulcrum for a more dynamic interpretation of cultural interaction and growth patterns in this part of the hemisphere. It is obvious that the majority of traits observed in Momíl form a complex which may be related typologically to those of many other sites where formative cultural materials have been found. As a matter of fact, with few exceptions, almost all elements, which in Mesoamerica are considered as Formative, were found to be present at Momíl and, on the other hand, there are a considerable number of traits which link Momíl with the Central-Andean preclassic cultures. Wauchope's (1950) and MacNeish's (1954) selected traits for the Mesoamerican Formative stage hold in many significant details for Momíl and so do most of Porter's (1953) comparisons. In general terms Momíl can be equated with the Chavín horizon in Peru and with Tlatilco-Zacatenco in Mesoamerica, while similarities to Ancón-Supe and Playa de los Muertos-Yarumela are very strong. But Momíl is not just a single simple complex of a few significantly associated traits; it forms a long sequence, the developmental phases of which are here of primary importance as their comparison may eventually reveal certain diffusional trends.

Comparing Momíl with Wauchope's 3-fold division of the Mesoamerican Formative, there seems to exist a significant correlation between Momíl II and the Protoclassic stage, while Momíl I would seem to contain undifferentiated traits of both the Village and the Urban Formative. Wauchope's postulated division is probably valid for most of Mesoamerica but not necessarily for the intermediate area where the Formative developments are slightly later, perhaps because of different cultivated staple foods. I am referring here to the manioc-maize sequence which, in a sense, may be equated with the Village-Urban sequence.

In Colombian Formative culture there never seems to have been a true urban development as far as population density and mound building is concerned, although ceremonial centers such as San Agustín may be included in a late Formative stage, as may the Tierradentro tombs. Seen in its whole cultural and ecological configuration, Momíl is definitely Village Formative; that is, it lags behind the Mesoamerican advance, and it is here that the problem of the economic basis of the local culture arises. In Momíl I there is no clear evidence for maize cultivation, metates and manos appearing quite suddenly in Momíl II, together with several traits suggestive of Mesoamerican influence such as basal-flanged bowls, tall tripod vessels, mammiform supports, and ornithomorphic whistles. Momíl I is dominated by a very characteristic element which I am inclined to associate with manioc: the large, flat circular plate with a sharply raised rim. In the preparation of foods based upon maize this type of rim has no function, but in the case of manioc flour or bread it is a necessity.

If we locate the entire Momíl sequence approximately between 1000 B.C. and A.D. 1, and take as points of reference the age of such maize growing cultures as Zacatenco and Cupisnique, an intermediate date for the introduction of a developed maize complex in early Momíl II times would fall within the range of probability.

This also might explain the obvious changes in culture context and the apparent lag in the Village-Urban sequence. On the Colombian scene the Mesoamerican Village-to-Urban settlement Formative sequence may have to be replaced by what I would call a riparian manioc-to-maize development. This was, in time, followed by an exclusively maize-agricultural stage of Sub-Andean characteristics, covering most of the first millennium after Christ, but being essentially "formative," in a developmental sense, when compared with coeval developments in Mesoamerica and the Central Andes.

As to possible relationships with other early Colombian cultures, it seems that Momíl is considerably later than Barlovento (Reichel-Dolmatoff 1955) which I believe to be essentially pre-Formative. With the material from Isla de los Indios (Reichel-Dolmatoff 1954) Momíl shares several significant traits such as dentate rocker stamping, broad-shallow line incision, crude crosshatched designs, and ovate bowls, and the late developments of Momíl can be correlated tentatively with La Paz (Reichel-Dolmatoff 1954) where hollow mammiform supports and resist-dye decoration were found. That my postulated First Painted horizon (Reichel-Dolmatoff 1954, Table 15) is derived from late Momíl, is also very probable.

Momíl is located almost exactly midway between the great cultural foci to the south and north and offers a privileged habitat close to several main migratory routes between those centers. Although systematic work in this crucial area has hardly begun, the evidence provided so far is highly suggestive. It opens new vistas on the complicated picture of Colombian prehistory, and may also help to unravel some of the more urgent questions concerning wider American interrelationships. That, at the same time, it poses a great many new problems, is in the nature of all research.

Dussán de Reichel, Alicia

1954 Crespo: Un nuevo complejo arqueológico en el Norte de Colombia. *Revista Colombiana de Antropología*, Vol. 3, pp. 173-88. Bogota.

Ford, J. A., Philip Phillips, and W. G. Haag

1955 The Jaketown Site in West Central Mississippi Valley. *Anthropological Papers of the American Museum of Natural History*, Vol. 45, Pt. 1. New York.

Macneish, R. S.

1954 An Early Archaeological Site Near Panuco, Vera Cruz. *Transactions of the American Philosophical Society*, n.s., Vol. 44, Pt. 5. Philadelphia.

Parsons, J. J.

1952 The Settlement of the Sinú Valley of Colombia. *Geographical Review*, Vol. 42, No. 1, pp. 67-86. New York.

Porter, M. N.

1953 Tlatilco and the Pre-Classic Cultures of the New World. *Viking Fund Publications in Anthropology*, Vol. 19. New York.

Reichel-Dolmatoff, Gerardo

1954 A Preliminary Study of Space and Time Perspective in Northern Colombia. *American Antiquity*, Vol. 19, No. 4, pp. 353-66. Salt Lake City.

1955 Excavaciones en los conchales de la Costa de Barlovento. *Revista Colombiana de Antropología*, Vol. 4, pp. 249-72. Bogota.

Steward, J. H.

1949 South American Cultures: An Interpretative Summary. In "Handbook of South American Indians," *Bureau of American Ethnology, Bulletin* 143, Vol. 5, pp. 669-772. Washington.

Strong, W. D.

1943 Cross Sections of New World Prehistory: A Brief Report on the Work of the Institute of Andean Research, 1941-1942. *Smithsonian Miscellaneous Collections*, Vol. 104, No. 2. Washington.

Wauchope, Robert

1950 A Tentative Sequence of Pre-Classic Ceramics in Middle America. *Middle American Research Records*, Vol. 1, No. 14, pp. 211-50. New Orleans.

Willey, G. R.

1955a The Interrelated Rise of the Native Cultures of Middle and South America. In "New Interpretations of Aboriginal American Culture History," *75th Anniversary Volume of the Anthropological Society of Washington*, pp. 28-45. Washington.

1955b The Prehistoric Civilizations of Nuclear America. *American Anthropologist*, Vol. 57, No. 3, pp. 571-93. Menasha.

Willey, G. R. and C. R. McGimsey

1954 The Monagrillo Culture of Panama. *Papers of the Peabody Museum, Harvard University*, Vol. 49, No. 2. Cambridge.

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FORMATIVE PERIOD CULTURES IN THE GUAYAS BASIN, COASTAL ECUADOR

CLIFFORD EVANS AND BETTY J. MEGGERS

GROWING knowledge of cultural sequences in Mesoamerica and in Peru has caused archaeologists interested in correlating these areas and explaining the derivation of various traits to look longingly at the little-known intermediate region occupied by Ecuador and Colombia. In the fall of 1954 an invitation by Emilio Estrada, Director of the Museo Arqueológico "Victor Emilio Estrada" in Guayaquil, Ecuador, gave us the opportunity to make a brief survey and to excavate stratigraphically a few sites in the Guayas Basin on the central coast of Ecuador (Fig. 1)*. One of the sites excavated*(R-B-1: La Chorrera) and two included in the survey (R-B-2: Al Frente el Tejar and G-D-8: Naupe) produced potsherds and other artifacts of types that have been classified as belonging to the Formative period in Middle America and Peru. This preliminary report, based primarily on the analysis of sherds and artifacts from the stratigraphic excavation at R-B-1: La Chorrera, has been prepared because the unusual combination of Mesoamerican and Peruvian Formative period traits helps to bridge the gap that has, up until now, existed between these 2 parts of Nuclear America.

The Guayas Basin includes several major tributaries of the Guayas River, which flow south approximately parallel to join just above the modern town of Guayaquil. The Formative period sites reported here are found on two of these tributaries, the Rio Daule and the Rio Babahoyo. Both are navigable streams, much used today for transporting goods and produce to and from Guayaquil. The banks are relatively low and level, consequently archaeological sites are readily distinguishable along the river edge even when the refuse deposit is only 1 m. thick. All 3 sites have the same general features. They are mounds produced by refuse accumulation in one spot, resulting from a sedentary mode of life. No distinct, carefully planned or constructed architectural features are evident. No Formative period cemetery sites have been located to date. Occasional fragments of human skulls and skeletons scattered in the refuse do not suggest formal burial and were not accompanied by grave offerings.

* The work was under the official auspices of the Smithsonian Institution and the Casa de la Cultura Ecuatoriano, Nucleo del Guayas. We wish to express our appreciation to Sr. Carlos Menendez Zevallos, President of the Guayaquil branch of the Casa de la Cultura, for granting official permission and to Sr. Emilio Estrada whose initiative, interest, and marvelous cooperation, made these archaeological investigations possible.

SITE DESCRIPTIONS

Site R-B-1: La Chorrera is a large mound under banana cultivation on Hacienda Buena Esperanza, located on the left bank of the Rio Babahoyo several kilometers downriver from the sugar mill, La Compañia, and approximately 7 km. below the modern town of Babahoyo. During the rainy season the swollen river cuts violently into the bank, slicing away the refuse mound so that now only a portion of the site remains. This exposed face reveals an accumulation over the original ground surface for a distance of 155 m. along the bank and 4 m. thick at the center. Sherds are scattered over the deposit for 60 m. inward from the bank, where the refuse mound tapers off to the flat, alluvial plain. To facilitate excavation and to test the deepest part of the deposit, a strata cut was made at the highest point on the river bank. Contamination that might have resulted from slumping was eliminated by discarding the outer 25 to 50 cm. Dirt could be shoveled out of the open end of the cut into the river. The strata cut was 3 by 5 m., excavated in 15-cm. levels. Everything was saved and shipped to the United States National Museum laboratory for study. No field classification or preselection of any sort was practiced.

Some slight differences in soil discoloration were noticed while digging, and later were distinguished in the profiles of the east and west face of the cut. From the surface to a depth of 1.25 to 1.50 m. the soil was a light-gray, sandy clay except for a lens of yellowish, almost sterile clay between 0.90 and 1.10 m. Then, brown loam appeared and continued to a depth of about 3.00 m., where it changed to dark gray. Sterile soil with an irregular surface appeared at a depth of 3.72 to 4.05 m. To check the sterile nature of this lower deposit, the

exposed outer bank was dug down 2 m. more to the water level. It is interesting to note that classification of the sherds by the standardized 15-cm. levels shows distinct cultural differences, which conform rather closely to the abrupt soil changes. This 4-m.-high mound was the result of the accumulation of refuse and not of artificial construction, and no house walls or foundations could be detected. Occasional irregular patches of sterile river clay may be house features and several hard-packed, trampled, uneven areas with a fire-burnt hearth pit suggest a house with a dirt floor.

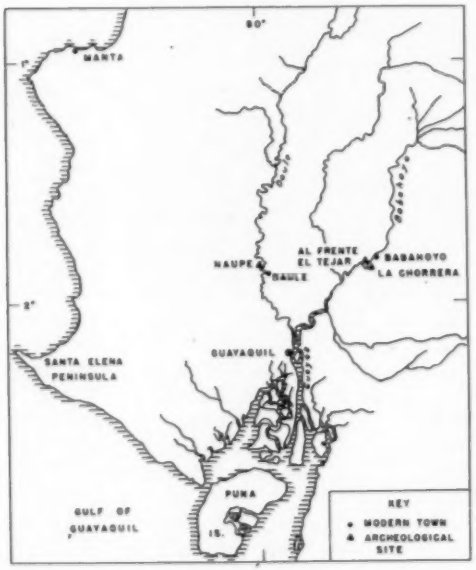

FIG. 1. Map of Formative period sites in the Guayas Basin, Ecuador.

Site R-B-2: Al Frente El Tejar. This site is another mound built up by the same conditions of refuse accumulation as at La Chorrera. It is about 4 km. downriver from La Chorrera on the right bank of the Rio Babahoyo on land belonging to the plantation, La Compañia. The site is opposite a farm, called El Tejar, on the left side of the river. To avoid confusion in the future in case more archaeological survey or excavation is done in this region and a site is actually located on El Tejar property, the mound with the complex of early materials has been designated as Site R-B-2: Al Frente El Tejar. The river has done more damage here than at La Chorrera, cutting away most of the refuse deposit so that it is exposed for a distance of about 200 m. along the bank with the highest point rising 2.50 m. above the sterile layer of clay. A large sherd sample was collected from the lower levels of the exposed bank.

Site G-D-8: Naupe is on the right bank of the Rio Daule approximately 6 km. upriver from the town of Daule. There are 2 rises of land about 50 m. apart. The upstream one, about 75 m. in diameter, was traversed by a large irrigation ditch extending inward from the bank and cutting into the refuse accumulation to a depth up to 2 m. The irrigation water pumped up from the river into this ditch had washed out pottery and stone artifacts, so that the bottom was literally paved with sherds and obsidian chips. A random sample collected here showed affiliations with Formative period material from the sites on the Rio Babahoyo. In August, 1955, Emilio Estrada made a stratigraphic excavation in the mound, demonstrating that it is the result of 6 m. of village refuse accumulation, consisting mostly of sherds.

Stratigraphic Establishment of Cultural Periods

The pottery and other artifacts from the 4-m. strata cut at La Chorrera show certain temporal changes that permit the establishment of 3 distinct cultural and temporal divisions. The Milagro period, represented in the upper part of the strata cut from the surface down to circa 1.35 m., witnesses the appearance of a plain pottery type with very sandy, micaceous paste and diagnostic vessel shapes. Several decorated types characteristic of the previous period are absent, but twig brushing is the only new technique of decoration. There is a continuation of incision on unpolished surfaces, cut and nicked appliqué ribs, and other simple ornamentation. Conoidal, rounded, biconoidal, and collared-conoidal pottery spindle whorls appear for the first time. This upper zone also introduces tall, double and/or twisted tripod-legged vessels (Jijón y Caamaño 1952, Fig. 33). The Milagro period is Post-Formative and will not concern us further in this preliminary report. The lower part of La Chorrera strata cut can be subdivided into the Tejar period, from about 1.35 to 3.00 m., and the Chorrera

period, below 3.00 m. A description of these 2 Formative cultures follows, beginning with the earliest.

The Chorrera Period. On the basis of an analysis of 11,055 sherds from the levels associated with this period, the characteristic plain pottery can be described as polished monochrome with very thin body walls (majority 3 to 4 mm.), fine sandy paste, slick surfaces often polished to a high luster, and a varying surface color that can be lumped into 3 general categories: gray to black, light red to tile orange, and brown to brownish orange. Taken as whole, this polished ware comprises a maximum of 56% of the pottery during the Chorrera period. Just prior to the beginning of the Tejar period, polished plain pottery declines rapidly in frequency and subsequently constitutes less than 6% of the total pottery from any level. Of the 3 color variations, polished red-orange is the most abundant, reaching a high of 40.6%. Neither polished gray-black nor polished brown ever exceeds 11%. Another diagnostic Chorrera period plain pottery type has a pebble polished surface leaving distinct striations on an unpolished background (Fig. 2 *k*, *l*). This striated or incompletely polished type becomes increasingly common as the fully polished types described above begin to decline, and reaches its maximum of 25.6% in the 3.30 to 3.45 m. level. Polished surfaces, whether completely or incompletely executed, are thus characteristic of the Chorrera period. Associated with these polished wares is a well-defined, gray-tan ware with sandy paste and very rough and uneven surfaces, the predominant vessel forms of which are small crude bowls and cups. Although in complete contrast to the polished types, this crude, unpolished pottery is equally characteristic of the Chorrera period, and continues into the early Tejar period only briefly and in a minor amount. Two other plain wares, the chief popularity of which is attained later, are also present, one a well-made pottery with a smooth surface and the other similar but with distinct scraping lines on the interior.

The decorated types can be discussed in 3 groups: (1) those confined to the Chorrera period; (2) those most abundant in the Chorrera period but continuing into the Tejar period, and (3) those beginning in the Chorrera period but most abundant in the Tejar period.

Three types of pottery decoration are limited to the Chorrera period: rocker-stamping, zoned red-and-black incision, and metallic lustrous painting. Rocker stamping was done with a smooth rocker in short strokes on an unpolished surface (Fig. 2 *n*). The sherds are small and there is no evidence as to the amount of surface occupied by the decoration. Ornamentation by incised lines separating red and black painted areas occurs on polished surfaces (Fig. 2 *i*, *j*). The incisions are well done but the black coloring is sometimes smeared over into the adjacent red zone.

The most unusual of the decorated types restricted to the Chorrera period is a metallic, lustrous (sometimes iridescent) design (Fig. 2 *a*, *b*) applied usually to the well-smoothed interiors of large flaring bowls with annular bases (called "ring-bases" by Middle Americanists). The design is drawn with strokes or twists producing broad (1.0 to 1.5 cm.) gleaming lines and dots, the luster of which is enhanced when the surfaces are moistened. This metallic lustrous ornamentation does not disappear when the sherds are refired to a temperature of 1000° C. The design result has a negative appearance when the unpainted portions are blackened in firing, as frequently occurs, but the paint was applied positively as a thin solution or slip, a point that can be demonstrated by examination under a microscope. The type is fully developed when it first appears in the lowest level of the La Chorrera strata cut and the shapes are highly sophisticated and nonexperimental. After attaining a popularity of 2.4%, it disappears at the close of the Chorrera period. The same pottery type has been reported elsewhere in Ecuador at Manta (Jijón y Caamaño 1952, Figs. 43-8) and in the La Libertad region of the Santa Elena Peninsula (Ferdon, Corbett, and Bushnell, personal communications, 1955; Bushnell 1951: 46).

Types of decoration most abundant in the Chorrera period but continuing into the succeeding Tejar period are burnished lines and zoned, polished red slip or paint. The burnished lines, applied on a well-smoothed (Fig. 2 *m*) or polished surface, were made with a pebble, hard nut, or similar tool. When the vessel surface is polished, the widely spaced, parallel, or intersecting lines are often barely visible except with the best lighting. Most

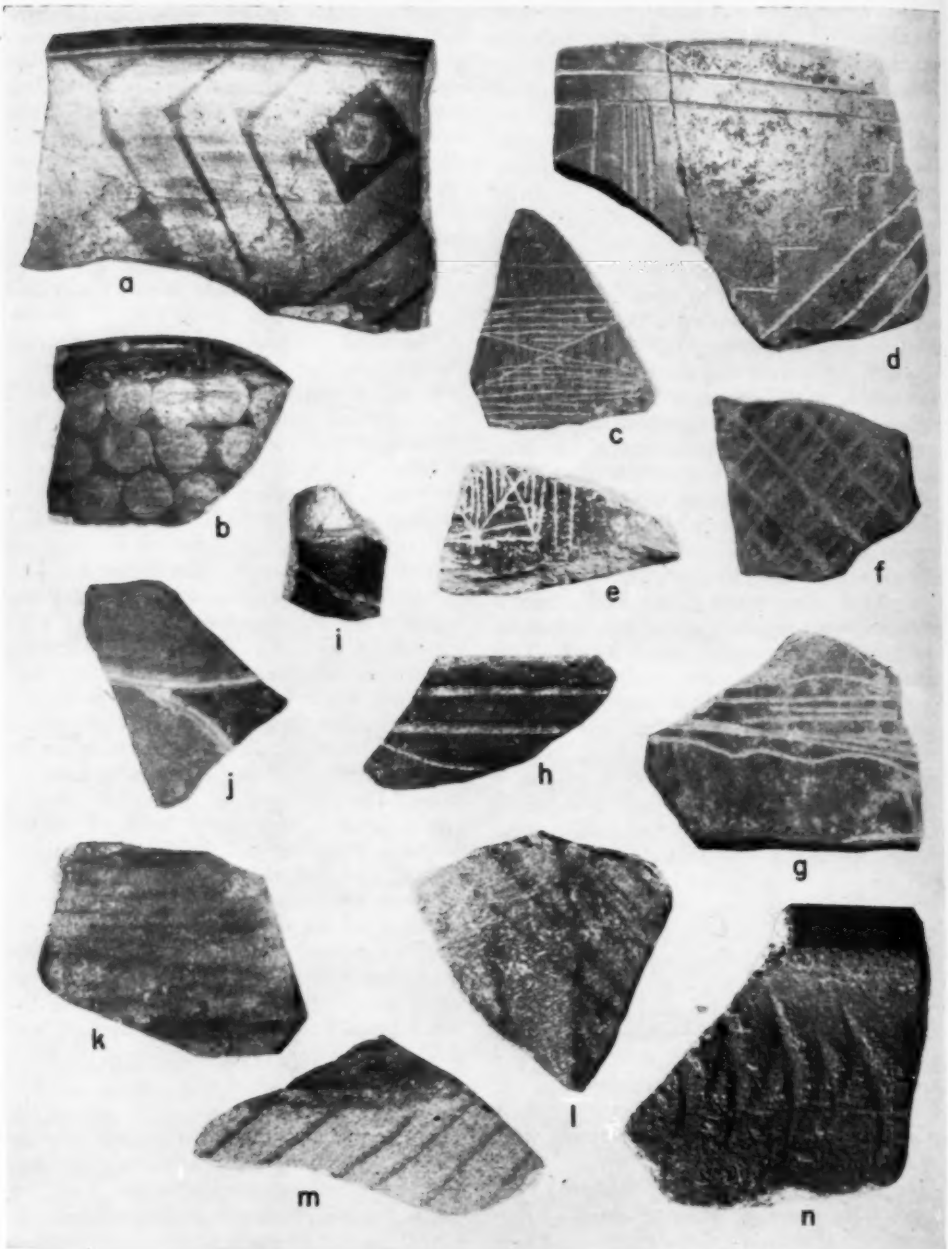

FIG. 2. Formative period pottery types. *a, b*, metallic, lustrous paint; *c-e*, fine incised on polished surfaces; *f, g*, incised-scraped on polished surfaces; *h*, broad, "U" incisions on polished surfaces; *i, j*, incised polished red with zoned black paint; *k, l*, pebble polished, striated plain pottery; *m*, line luster on smoothed surfaces; *n*, plain (smooth) rocker stamped.

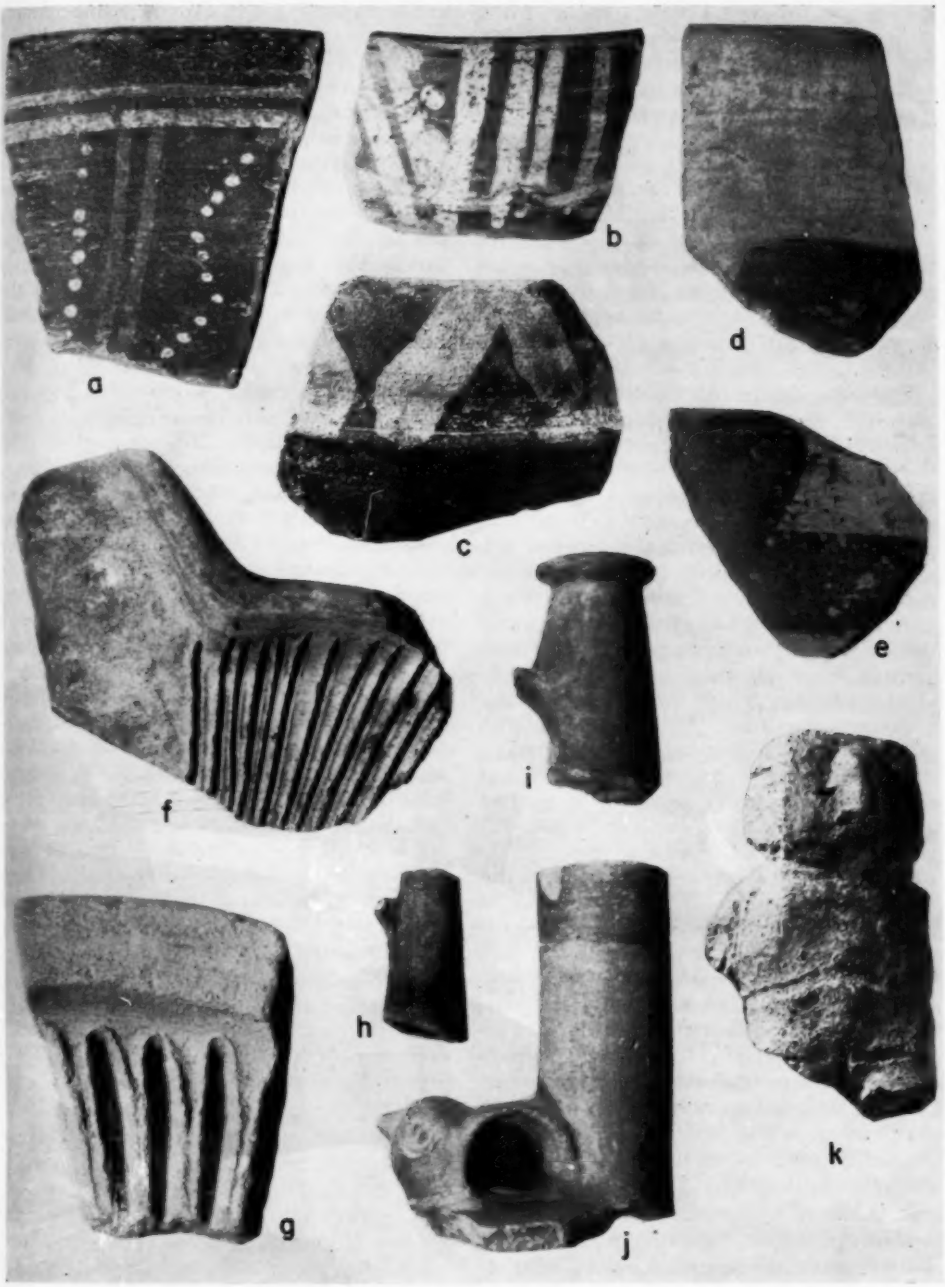

FIG. 3. Formative period pottery types. *a*, *b*, white paint on polished red; *c*, white paint on unpolished red; *d*, *e*, polished white slip and polished red slip; *f*, flat-bottomed grater bowl with spout; *g*, round-bottomed grater bowl; *h-j*, bottle spouts with loop or strap handles and whistles; *k*, crude figurine of Chorrera period.

common in the early Chorrera period, where it reaches a maximum frequency of 2.9%, burnished line decoration declines to a fraction of a percent in the late Chorrera and early Tejar periods. The application of a red slip or thick red paint to the upper portion of a vessel, varying from the rim, neck, and shoulder to the inner surface of the rim, and the polishing of this red area often to a high luster is a decorative technique found in all levels of the La Chorrera excavation. However, it is frequent only in the Chorrera period, when it represents 5% to 8% of the pottery. In the subsequent Tejar and Milagro periods it rarely exceeds 1%.

Beginning during the Chorrera period but achieving their maximum popularity in the Tejar period are the following types of decoration, discussed in more detail under the Tejar period: red wash, incised lines on polished surfaces, incised lines on unpolished surfaces, negative painting, polished red slip and polished white slip, zoned punctate on unpolished surfaces, and cut, nicked, or finger-pressed ribs.

Although a detailed rim, base, and vessel shape analysis of each pottery type has not yet been made, certain vessel forms characteristic of the Chorrera period may be mentioned. Most common are: (1) open bowls with straight outsloping or flaring sides, thickened on the interior 2 to 6 cm. below the rim and tapering from this point to the lip to produce a broad, flat band along the rim interior; (2) globular bowls with constricted mouth; (3) globular jars with short neck, constricted mouth and everted rim; and (4) globular or rounded bottles. The most common base forms are flat and annular. The latter are 1 to 3 cm. high and range from a simple ring with almost vertical walls to a flaring ring. Bottle spouts (Fig. 3 *h-j*) are either straight walled or tapering, ending in a thin, flat lip or a slightly rounded, externally thickened lip. Projecting from the lower half of most of the bottle spouts is a flat strap handle, the other end of which is usually attached to a bird adorno containing a whistle (Fig. 3 *j*).

In addition to the ceramic complex just described, 2 types of pottery objects are restricted to the Chorrera period: tubular or "napkin-ring" ear spools and crude figurines. Six ear spool fragments were found in La Chorrera excavation and two at Ñaupe (Fig. 4 *a-c*). All eight are made of extremely fine-textured pottery with highly polished, tan to dark brown surfaces. The profile is expanding rather than cylindrical so that one end is 4 to 5 mm. greater in exterior diameter than the other. The larger end is strongly everted, while the smaller one is only slightly outturned or thickened. The length (height) ranges from 1.4 to 2.7 cm. Diameters of the larger ends on 3 specimens are 2.7, 3.6, and 4.8 cm., the corresponding smaller ends being 2.3, 3.2, and 4.3 cm. Body wall thickness is 2 to 3 mm. at the center of the shaft, tapering to 1.5 or 1.0 mm. at the ends. All are plain except one fragment that bears an incised line on the exterior.

One nearly complete figurine (Fig. 3 *k*), one head, and one foot fragment came from stratigraphic levels of the Chorrera period. The 2 heads are almost the same size and very similar in execution, rectangular in front view and flat in back (width 2.5, height 1.7 cm., thickness 0.9 and 1.2 cm.). The nose is the only prominent feature, the eyes and mouth being omitted on one and shown as horizontal slits on the other. The head fragment has a red-slipped surface, while the complete specimen is plain. It has a stubby, rectanguloid body, short legs (feet broken off) and rudimentary arms. Existing height is 5.4 cm., thickness 1.5 cm. Incised lines around the waist and hips may represent clothing. The paste is sandy and the surfaces poorly smoothed. These figurines can be described as exceedingly crude and simple. The foot of a larger figurine from the same levels is much better finished, with an even surface, and well-executed incised lines demarking 4 toes.

The Tejar Period. The middle portion of the strata cut, between about 1.35 and 3.00 m., produced a complex of pottery and other arti-

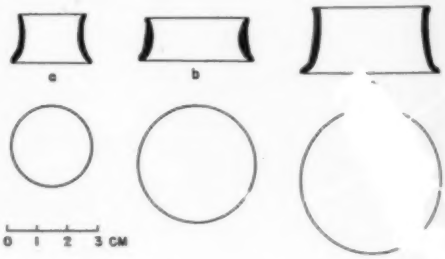

FIG. 4. *a-c*, Chorrera period polished pottery "napkin-ring" ear spools.

facts that distinguish it from the preceeding Chorrera period and the later Milagro period. In the sample of 28,288 sherds from these levels, the dominant plain pottery type is the smooth-surfaced, sandy-textured, light-tan to gray ware that began to develop in the Chorrera period. During the Tejar period it represents 35% to 49% of the total sherds per level. A related type with scraped interior surfaces also continues from the preceding period and occurs in a frequency of 10% to 18% during the Tejar period. An innovation at the beginning of this period is a coarse ware tempered with sand particles up to 3 mm. in diameter. Both paste and surfaces are tan to tile-orange and the vessels are mostly large jars and ollas with body walls from 1.0 to 1.5 cm. thick. This type appears at 3.00 m. with a percentage occurrence of 0.9 and steadily increases in popularity so that by the end of the Tejar period it comprises 32% of the total sherds per level. The polished monochrome ware and the striated ware so abundant in the Chorrera period survive in a minor amount, while the very crude, sandy-textured plain pottery type that was associated with them dies out early in the Tejar period.

Diagnostic decorated types of the Tejar period are zoned between incisions, 2 varieties of white-on-red, and negative painting. With the exception of one sherd from an earlier level, incised and zoned red on unpolished surfaces occurs only in the Tejar period. The red paint is often carelessly applied and frequently appears as a band around the rim, while parallel lines are the most common incised design motif. Also limited to this period is a white-on-red type in which narrow white lines and dots are drawn on polished red surfaces (Fig. 3 *a*, *b*). A typical vessel shape with this decoration is the *compotera*, a shallow bowl on a tall pedestal. Another kind of white-on-red ornamentation also begins and reaches its maximum popularity (7%) in the Tejar period, but continues into the following period. This type is cruder, the white paint being a thin wash applied to an unpolished red-orange surface (Fig. 3 *c*). Most of the vessels are medium to large utility jars and ollas with the design, composed of broad lines, bands, dots or splotches, applied to the thickened, everted rim or shoulder. The simultaneous appearance of these 2 white-on-red varieties with different vessel shapes suggests a single innovation that was varied in its execution in accord with the function the vessel was to serve.

Although negative (resist dye) painting begins in the latter part of the Chorrera period and continues as a sporadic minority type in the Milagro period, it is predominantly identified with the Tejar period. Sherds classified as negative painted never constitute more than a fraction of a percent in any one level. However, this may be a reflection of poor preservation rather than extreme scarcity of the type since negative painting is highly fugitive and many of the designs are visible now only when the sherd is moist or when it is tilted to catch the most favorable light. The negative design elements are wide or narrow, straight or wavy lines, dots, and scallops (Fig. 5 *a-d*). This technique was applied most frequently to an orange-red, unslipped, polished or unpolished surface, but it is also found on polished white slip. Negative painted pottery bears an interesting affiliation in chronology and in motif to the metallic luster painting of the Chorrera period. It makes its appearance at the exact time when the metallic luster painting disappears and utilizes similar, although more complex, broad line and dot design motifs. The possibility that the metallic luster painting may be ancestral to negative painting in Ecuador is being explored by ceramic technologists.

Beginning earlier but reaching maximum frequency in the Tejar period are polished red and polished white slips and incision on polished surfaces. In the latter, the incised lines are either distinct fine marks made with a sharp tool when the clay was fairly wet (Fig. 2 *c-e*), wider lines drawn when the clay was dryer so that a scraped effect is sometimes achieved (Fig. 2 *f*, *g*), or, more rarely, broad U-shaped incisions (Fig. 2 *h*). Design elements include crosshatch, parallel, diagonal, and stepped lines, and some curvilinear elements in zoned or all-over patterns. Along with burnished lines, this incised type disappears by the end of the Tejar period. The polished red and polished white slips continue into the Milagro period in minute amounts, but during the Tejar period maintain a frequency of 2.0% to 3.6%. The slips are thick and combined on the vessel surfaces to produce simple designs of broad bands and patches (Fig. 3 *d*, *e*).

Zoned polished red slip is less frequent than in the Chorrera period, its place being taken by a thin red wash applied all over or in zones on unpolished surfaces. This begins to be popular in the latter part of the Chorrera period and during the Tejar period represents 9% to 15.4% of the total sherds.

After the Chorrera period there is an increase of decorated types on unpolished plain surfaces. Incised designs utilizing simple combinations of wavy, crisscross, and parallel lines show little variation in style from their inception in the late Chorrera period, through the Tejar period until the last level of the Milagro period. Also occurring in most levels of the strata cut (except the early Chorrera period) are punctate decoration, sometimes in zones bounded by incised lines, and appliqué ribs whose upper surface is nicked, notched, or finger-pressed for embellishment. These relatively crude forms of decoration together comprise about 3% of the pottery in most levels and often represent about half of the total decorated sherds.

Graters constitute a new kind of pottery vessel first appearing at the beginning of the Tejar period. There are 2 shapes: (1) large, open, round-bottomed bowls (Fig. 3 *g*) and (2) broad, flat-bottomed, rectanguloid bowls with high, outslanting walls and mouth or spout at one end or corner (Fig. 3 *f*). The interior of the bottom is covered with rows of deep, well-defined grooves. Although the specific purpose of these graters is not known, it seems reasonable to infer that their sudden introduction correlates with that of some new food or new method of food preparation.

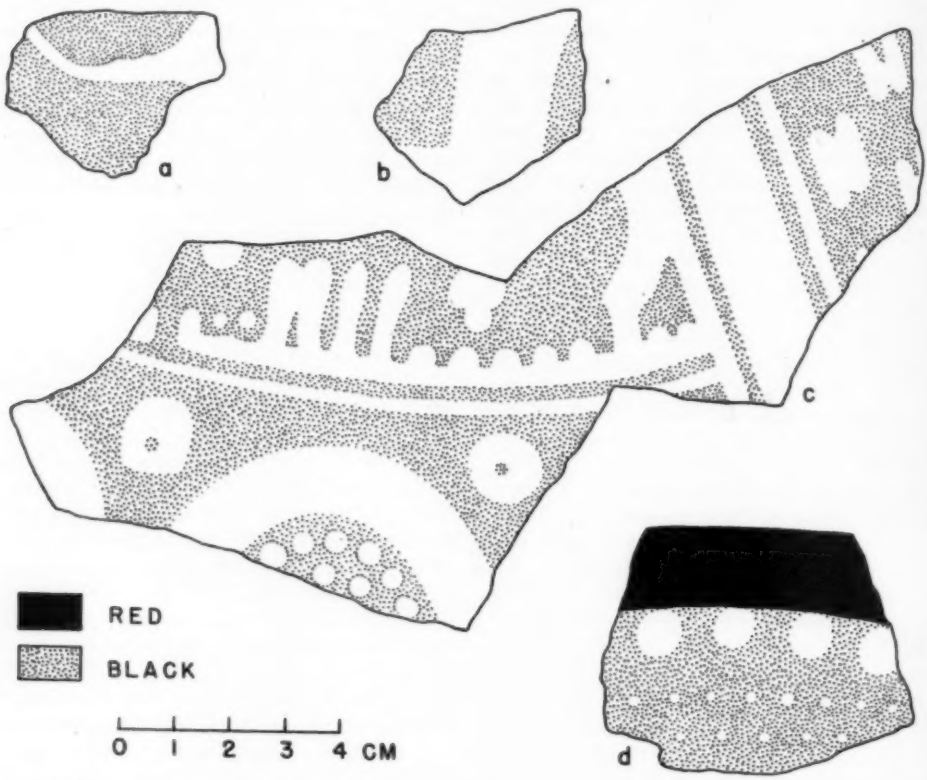

FIG. 5. Negative painted pottery. *a*, negative on polished white slip; *b-c*, negative on polished, unslipped surfaces; *d*, negative on polished, unslipped surfaces with an added band of red paint.

An unusual artifact of stone restricted to the Tejar period is a painted pebble, fourteen of which were recovered from La Chorrera cut. They are 2 to 4 cm. long, and are either rounded waterworn pebbles or irregularly broken and crudely smoothed rock fragments. Except for two that are red over the entire surface, all are painted red at both ends leaving an unpainted band 4 to 9 mm. wide around the middle. When the first example was found it was thought the banding might be natural. However, the variety of rocks represented, examination under a microscope, and inspection by geologists left no doubt that painting was involved. The somewhat wavy yet well-defined edge of the red painted zones suggests that a resistant material may have been applied around the center and the pebble then dipped in the coloring solution. It is of interest in this connection that painted pebbles have almost exactly the same time span as negative painted pottery.

Sherds worked into a disc 3.0 to 4.5 cm. in diameter and biconically drilled through the center occur throughout the Tejar period and probably were used as spindle whorls. Two linked copper rings, 1.5 cm. in diameter, from the 2.10 to 2.25 m. level, provide the first evidence of the use of metal in the excavation.

Comparison with Formative Traits in Middle America and Peru

The existence of a widespread Formative horizon in the Americas was suggested by Strong (1943) as an explanation for resemblances he found between Playa de los Muertos remains in Honduras and Chavín-like materials on the coast of Peru. More recently, Willey (1955), Steward (1949), and others have elaborated the concept and explored its developmental and diffusional aspects. The absence of any data from the connecting region, occupied by lower Central America, Colombia, and Ecuador, has handicapped attempts to determine the origin and trace the dispersal of Formative period traits, and it is information bearing on these problems that is probably the most significant aspect of the Formative period sites described here from the Guayas Basin of coastal Ecuador.

The comparisons and identifications are based on actual matching of sherd samples from La Chorrera with sherds from the following sites: Playa de los Muertos (Farm 11) on the Ulua River and Santa Rita (Farm 17) on the Comayagua River, Honduras (Peabody Museum of Archaeology and Ethnology, Cambridge); Tlatilco, Tres Zapotes, La Venta, and Virú Valley sites (United States National Museum); Ancon and Supe (American Museum of Natural History). Selected type samples of ceramics from the Pavón site and from Vaillant's excavations in the Valley of Mexico were also examined in the American Museum of Natural History. These comparisons are supplemented by familiarity with Chavín, Cupisnique, and Salinar specimens in Peruvian collections and by discussions with Middle Americanists and Peruvianists. Others as well as ourselves have been struck by the fact that if it were not for the identifying catalog numbers, sherds of many of the types from Middle America and Peru could not have been distinguished from those excavated at La Chorrera. For this preliminary report, it has not been possible for us to examine sherd samples from the early horizons in Yucatán or Guatemala; therefore no comment can be made on the presence or absence of similarities.

In presenting the comparative data, we will first discuss features that identify the Chorrera and Tejar period complexes as Formative, and thus expand the geographical area in which this horizon is represented. Following this we will mention the traits that relate either to Middle America or to Peru but are not common to both.

General Formative Period Traits. In all details of body wall thickness, vessel shape, paste, and surface texture and color the polished monochrome pottery of the Chorrera period resembles the polished brown-black wares of the Tlatilco site (Porter 1953: 35, Pls. 7-11), the Lower Tres Zapotes Coarse Paste Brown (or "Red") ware and Black ware (Drucker 1943: 47-69), and the Playa de los Muertos plain wares known as Subtype 2: slipped and polished orange-red to brown ware; Subtype 3: dark gray to black highly polished ware; and Subtype 4: slate gray to buff highly polished ware (Strong, Kidder, and Paul 1938: 72-3). Among early Peruvian materials, the same close relationships obtain with Ancon Polished Black and Ancon Polished Red from Ancon and Supe (Willey and Corbett 1954: 53-4) and from various sites in the Virú Valley

(Strong and Evans 1952: 256-9; Larco Hoyle 1945: 7-16), and with the polished monochrome black, brown and red wares from Chavín de Huántar (Bennett 1944: 81-4).

Bottle spouts (Fig. 3 *h-j*) with direct or thickened rims, vertical, tapered, or flaring sidewalls, and often attached by a broad, flat loop, strap, or bridge handle to a whistle adorno, are typical of the Chorrera and Tejar periods. In form and ware (usually polished monochrome) they are comparable to some of the bottle spouts from Tlatilco (Porter 1953, Pls. 6 *G-I*, 7 *A-I*, 8 G) and from Chavín horizon sites on the Central and North Coast of Peru (Willey and Corbett 1954, Pls. 6 *a*, *c*, 8 *u*, *v*; Ford and Willey 1949, Pl. 6 *I*; Strong and Evans 1952, Fig. 36, Pls. 2 *b*, 3 *c*, 4 *d*, *f*). Although the shape of Playa de los Muertos spouts is similar, they differ in point of attachment to the side of the vessel and the resulting vessel form is not found in the Ecuador material.

The striated or incompletely polished pottery from the Chorrera and Tejar periods (Fig. 2 *k*, *l*) closely resembles Huacapongo Polished Plain from the North Coast of Peru (Strong and Evans 1952: 259-61, Fig. 37, Pls. 2 *F*, 4 *A*, *C*, *E*, *K*; Ford and Willey 1949, Pl. 5 *n-q*; Collier 1955, Fig 65) and Ancon Pebble Polished from the Central Coast (Willey and Corbett 1954: 54). Striated polished pottery also occurs in the early periods in Middle America. It is common in the Playa de los Muertos material, although not illustrated in the published report.

Plain (smooth) rocker stamping (Fig. 2 *n*) is limited to the Chorrera period at La Chorrera. In Middle America, it is found at Tlatilco (Porter 1953: 37-8, Pls. 9 *H*, 11 *F*, G) and Playa de los Muertos (Strong, Kidder, and Paul 1938, Pl. 9 *c*, *e*). Rocker stamping in the early horizon in Peru, as exemplified at Ancon, utilizes dentate as well as plain rocker, but the latter is the more common (Willey and Corbett 1954: 43-5, Pl. 8 *f*, Fig. 3).

Fine line incision (Fig. 2 *c-g*) and broad line incision (Fig. 2 *h*) on polished monochrome surfaces furnish another decisive link between the Chorrera and Tejar periods of Coastal Ecuador and other Formative period sites of Nuclear America. They occur at Playa de los Muertos (Strong, Kidder, and Paul 1938, Pl. 11 *f*, *h*), Tlatilco (Porter 1953, Pl. 11), Ancon and Supe (Willey and Corbett 1954, Figs 1-2, 7-8), and at Cupisnique (Coast Chavín) period sites on the Peruvian North Coast (Collier 1955, Fig. 71; Strong and Evans 1952, Figs. 50-1; Larco Hoyle 1941, Figs. 58, 64, 107, 109).

Red paint on unpolished surfaces between incised lines and zoned polished red without bordering incisions from the Chorrera and Tejar periods are identical to the zoned red from Ancon and Supe (Willey and Corbett 1954, Fig. 8 *c*, *e*, *g-i*), and from the Virú Valley (Collier 1955: 203-4). At Playa de los Muertos, red-on-buff sherds are one of the most common pottery types in the lower, earlier group of levels designed as "C" (Strong, Kidder, and Paul 1938: 70, 74). Tlatilco Red-on-Buff pottery and Tlatilco Red-Zoned Ware (Porter 1953: 35-6, Figs. 6, 8) are further examples from the Formative period in Middle America.

Fine line decoration in white paint on polished red surfaces (Fig. 3 *a*, *b*) and lines, dots, and bands in white wash on unpolished red or orange surfaces (Fig. 3 *c*), characteristic of the Tejar period, occur widely throughout the Formative horizon of Middle America and Peru in a sufficiently consistent temporal position so that it has been possible to utilize white-on-red as a horizon style. Its appearance in Ecuador at the beginning of the Tejar period, following the decline of polished monochrome pottery, rocker stamping, and other Chorrera period types, conforms to the relative position of white-on-red styles in both highland and coastal Peruvian sequences (Strong and Evans 1952: 295-301, Pls. 2 *B-D*, *G-H*, 3 *A-B*, 4 *G-I*; Willey 1943: 191-2, Pls. 1-5; Bennett 1944: 92). The Ecuadorean white-on-red pottery is very much like white-on-red ware from Middle America, which has a distribution from the Early to Middle periods at such sites as Zacatenco (Vaillant 1930: 88-9) and El Arbolillo (Vaillant 1935: 231).

Negative (resist dye) painting is too complex a problem to permit detailed comparative discussion in this preliminary report. The point of importance is that negative painted pottery appears at about the same point in the Ecuadorean sequence as it does in Peru on the North Coast and in the North Highlands, that is, about the middle of the Formative period. The stratigraphic excavation at La Chorrera does not provide clear-cut evidence either for or against an earlier occurrence of negative painting in Ecuador.

Formative Traits of Restricted Distribution. While the Formative horizon shows a general uniformity, illustrated by the traits just discussed, distinctive features characterize and individualize Formative cultures in different parts of Nuclear America. The Chorrera and Tejar period complexes from La Chorrera are interesting for the combination of Peruvian and Middle American traits that they present — traits that have hitherto not been found in association. Whistles in adornos at the end of flat strap, loop, or bridge handles, and incised areas on polished red surfaces with the addition of black paint in small zones, both typical of the Chavín and Salinar periods in Peru might have been expected in Ecuador, but pottery "napkin-ring" ear plugs, polished red and polished white slips, and certain vessel shapes characteristic of Middle America have not previously been reported from the Formative horizon in the Andean Area.

The use of whistles, often modeled in a bird or other effigy form on the top of a vessel, balancing the spout and attached to it by a flat strap handle, begins in the Salinar period of North Coast Peru (Strong and Evans 1952, Pls. 2 *B*, 3 *C*; Larco Hoyle 1944: 5, 11). The method of construction and principle of operation are similar to those from the Chorrera and Tejar periods in Ecuador (Fig. 3 *j*). Zoned red-and-black incised from the Chavín period (Bennett 1944: 81, Fig. 30; Collier 1955: 203-4, Figs. 68 A-C, 69; Larco Hoyle 1948: 18-19, 67) is indistinguishable from that of the Chorrera period (Fig. 2 *i*, *j*). Although this type of decoration is not mentioned in the report on the early sites at Ancon (Willey and Corbett 1954) and its absence south of Chimbote is mentioned by Collier (1955: 204), excellent examples of this Coastal Chavín style of incised zoned black paint on polished red-orange and brown ware were collected by Evans, Willey, and Strong in 1946 from the vicinity of Willey's 1941 excavations at Ancon.

The beautifuly made, highly polished, pottery "napkin-ring" earplugs restricted to the Chorrera period in the coastal Ecuador sequence (Fig. 4 *a-c*) have never been found in Peru. However, specimens with the same form, paste, and surface finish come from Formative period Middle American sites. Direct comparisons can be made with polished pottery "napkin-ring" earplugs from Kaminaljuyú (Kidder, Jennings, and Shook 1946: 215, Fig. 91), the Mamon or Chicanel horizon at Uaxactun (Ricketson and Ricketson 1937, Pl. 696), the Middle period at Zacatenco (Vaillant 1930, Pl. 40), the Intermediate period at Ticoman (Vaillant 1931, Pl. 82), Periods I and II of El Arbolillo (Vaillant 1935: 237-9, Fig. 25), and the Pavón site, Panuco, Vera Cruz (Ekholm 1944: 467-9; Fig. 47 *h*, *k*).

Sherds with polished red slip and polished white slip (Fig. 3 *d*, *e*) of the Chorrera and Tejar periods are identical in all features including vessel shape with specimens from Playa de los Muertos (Strong, Kidder, and Paul 1938, Pl. 11 *a-e*, *l-m*). Direct comparison with type samples of Chila White from Period I in the Tampico-Panuco sequences (Ekholm 1944: 341-3, 423-5) shows a high degree of similarity. White Ware is also found in the Early period at Zacatenco (Vaillant 1930: 82-3), in Period I at El Arbolillo (Vaillant 1935: 227-31), and less abundantly in the early levels at Ticoman (Vaillant 1931: 386-7).

Some of the Chorrera period vessel shapes, especially those associated with lustrous painted decoration (Fig. 2 *a*, *b*) are completely different from anything known in corresponding periods in Peru, but are very similar to vessel shapes from Middle America. Open bowls with flaring outcurved walls, annular (ring) base, with either a narrow rib several centimeters below the rim or a thickened area along the rim on the interior, and occasionally a basal flange, occur in many places in Middle America from the Formative period onward.

CONCLUSION

Survey and excavations in the Guayas Basin of coastal Ecuador have revealed the presence of 2 complexes that fit into the Formative period sequences established in Peru and Middle America, both in content and chronological position. The earliest, called the Chorrera period, is characterized by a predominance of polished monochrome and striated, pebble-polished plain pottery, and various types of decoration such as lustrous painting, plain (smooth) rocker stamping, and incision on polished red surfaces with black painted zones. Certain features of this period, such as pottery "napkin-ring" earplugs and bowl forms, have their closest affiliation with materials from early sites and periods in Middle America. Char-

acteristic of the succeeding Tejar period are a smooth-surfaced, sandy-textured, unpolished plain ware, and the appearance of a coarse tempered utility ware, zoned red between incisions on unpolished surrfaces, negative painting, white paint on polished red surfaces, white wash on unpolished red surfaces, graters, and painted pebbles. Some traits found in both the Chorrera period and the Tejar period are red wash, incised lines on polished and unpolished surfaces, polished red slip and polished white slip, zoned punctate on unpolished surfaces, and cut, nicked, or finger-pressed ribs.

The presence of these 2 Formative period complexes on coastal Ecuador is significant in 2 respects: they increase the known geographical distribution of Formative period remains in South America and they demonstrate that certain traits, like pottery "napkin-ring" earplugs, formerly thought to be exclusively Middle American, reached northwestern South America in the Formative period.

BENNETT, W. C.

1944 The North Highlands of Peru: Excavations in the Callejón de Huaylas and at Chavín de Huántar. *Anthropological Papers of the American Museum of Natural History*, Vol. 39, Pt. 1. New York.

BUSHNELL, G. H. S.

1951 *The Archaeology of the Santa Elena Peninsula in South-West Ecuador*. University Press, Cambridge.

COLLIER, DONALD

1955 Cultural Chronology and Change as Reflected in the Ceramics of the Virú Valley, Peru. *Fieldiana: Anthropology*, Vol. 43. Chicago.

DRUCKER, PHILIP

1943 Ceramic Sequences at Tres Zapotes, Vera Cruz, Mexico. *Bureau of American Ethnology, Bulletin* 140. Washington.

EKHOLM, G. F.

1944 Excavations at Tampico and Panuco in the Huasteca, Mexico. *Anthropological Papers of the American Museum of Natural History*, Vol. 38, Pt. 5. New York.

FORD, J. A. AND G. R. WILLEY

1949 Surface Survey of the Virú Valley, Peru. *Anthropological Papers of the American Museum of Natural History*, Vol. 43, Pt. 1. New York.

JIJÓN Y CAAMAÑO, JACINTO

1952 *Antropologiá prehispanica del Ecuador: Resumen — 1945*. Quito.

KIDDER, A. V., J. D. JENNINGS, AND E. M. SHOOK

1946 Excavations at Kaminaljuyu, Guatemala. *Carnegie Institution of Washington, Publication* 561. Washington.

LARCO HOYLE, RAFAEL

1941 *Los Cupisniques*. Lima.

1944 *Cultura Salinar*. Buenos Aires.

1945 *Los Cupisniques*. Buenos Aires.

1948 *Cronologiá arqueológica del norte del Peru*. Buenos Aires.

PORTER, M. N.

1953 Tlatilco and the Pre-Classic Cultures of the New World. *Viking Fund Publications in Anthropology*, No. 19. New York.

RICKETSON, O. G., JR., AND E. B. RICKETSON

1937 Uaxactun, Guatemala: Group E 1926-1931. *Carnegie Institution of Washington, Publication* 477. Washington.

STEWARD, J. H.

1949 Cultural Causality and Law: A Trial Formulation of the Development of Early Civilization. *American Anthropologist*, Vol. 51, No. 1, pp. 1-27. Menasha.

STRONG, W. D.

1943 Cross-Sections of New World Prehistory. *Smithsonian Miscellaneous Collections*, Vol. 104, No. 2. Washington.

STRONG, W. D. AND CLIFFORD EVANS

1952 Cultural Stratigraphy in the Virú Valley Northern Peru: The Formative and Florescent Epochs. *Columbia Studies in Archeology and Ethnology*, Vol. 4. New York.

STRONG, W. D., ALFRED KIDDER II, AND A. J. DREXEL PAUL, JR.

1938 Preliminary Report on the Smithsonian Institution — Harvard University Archeological Expedition to Northwestern Honduras, 1936. *Smithsonian Miscellaneous Collections*, Vol. 97, No. 1. Washington.

VAILLANT, G. C.

1930 Excavations at Zacatenco. *Anthropological Papers of the American Museum of Natural History*, Vol. 32, Pt. 1. New York.

1931 Excavations at Ticoman. *Anthropological Papers of the American Museum of Natural History*, Vol. 32, Pt. 2. New York.

1935 Excavations at El Arbolillo. *Anthropological Papers of the American Museum of Natural History*, Vol. 35, Pt. 2. New York.

WILLEY, G. R.

1943 Excavations in the Chancay Valley. In "Archeological Studies in Peru 1941-1942," by W. D. Strong, G. R. Willey, and J. M. Corbett. *Columbia Studies in Archeology and Ethnology*, Vol. 1, pp. 123-97. New York.

1955 The Interrelated Rise of the Native Cultures of Middle and South America. In "New Interpretations of Aboriginal American Culture History," pp. 28-45. *75th Anniversary Volume of the Anthropological Society of Washington*. Washington.

WILLEY, G. R. AND J. M. CORBETT

1954 Early Ancon and Early Supe Culture: Chavín Horizon Sites of the Central Peruvian Coast. *Columbia Studies in Archeology and Ethnology*, Vol. 3. New York.

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COMPARATIVE NOTES ON THE HAND-EYE AND RELATED MOTIFS

ROBERT L. RANDS*

ALMOST 50 years ago, Clarence B. Moore called attention to the presence of "the symbol of the open eye on the open hand" in both the Southeastern United States and Mexico (Moore 1907: 346). The design has achieved some renown as one of the motifs characterizing the so-called "Death Cult" in the Southeast and has also continued to be cited as an indication of Middle American connections (for example, Phillips 1940: 356). Rather little has been done in following up Moore's observation through detailed comparative studies between the 2 areas. Recently, however, Schuster (1951), and following him, Covarrubias (1954), have touched upon the hand and eye motif in these regions as part of a larger problem — that of cultural connections between the Old World and the New. They have noted the existence of eyelike forms on the hand in the art of various American cultures, extending in a broken distribution from Peru (Schuster 1951, Fig. 82) to the Northwest Coast (Schuster 1951: 16-17; Covarrubias, 1954: 35, 190, Fig. 56). The same writers have presented extensive data which would seem to indicate a connection of the hand and eye with various markings, including faces and nucleated circles, on the joints of arms and legs (see also Schuster 1952; Seler 1902-23, Vol. 2: 955-6).

It is not the purpose of the following remarks to consider the more far-flung of these correspondences. The comments, rather, are an expansion of a paper given before the Eleventh Southeastern Archaeological Conference at Moundville, Alabama, in November, 1954. As such, their point of departure is the eastern United States, with particular reference to the art of the Southern Cult. Nevertheless, the culture areas from which comparative material is drawn, Mesoamerica and the Northwest Coast, must be acknowledged by any but an arch diffusionist to be geographically remote. No implication is made that the various art forms to be discussed are necessarily related historically.

To give additional perspective to the specific comparisons which follow, it should be noted that, in Southeastern art, hands lacking an eye at the palm have been cited as showing Mexican affiliations. Moore (1907: 346) made comparisons with the severed hand as depicted in Mexico, and more recently particular attention has been directed to similar subjects, strongly Moundville-like in character, at Tizatlán in Tlaxcala (Griffin 1949: 97; Noguera 1927; Marquina 1951, Fot. 34; Moore 1905, 1907). Mention might also be made of the Moundville-like aspects of one of the Classic Veracruz yokes, which shows the human radius and ulna stripped of flesh but attached to a hand from which the flesh has not been removed (Proskouriakoff 1954, Fig. 2, Yoke 13; Moore 1905, Fig. 147). A description relating to the Aztec is very suggestive of the Southeastern Death

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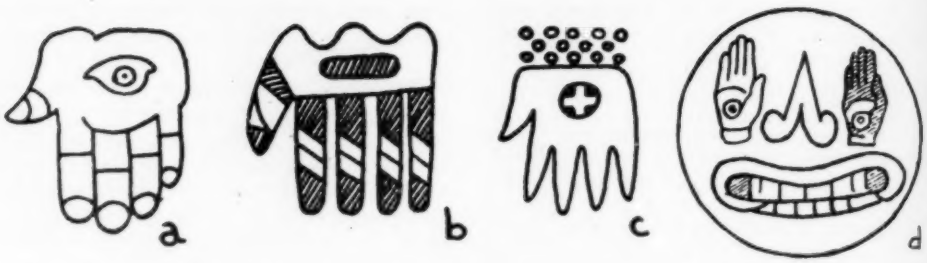

FIG. 1. Variants of the hand and eye motif. *a*, *b*, *c*, Southeastern United States (after Waring and Holder 1945, Figs. 1, 7 *a-c*); *d*, Lienzo de Tlaxcala: 40 (after Seler 1902-23, Vol. 2: 569, Fig. 99).

Cult in this general connection. The passage is from Sahagún and deals with the war god, Uitzilopochtli: "And the cape . . . was designed with skulls, with the palms of hands, with hip bones, ribs, legs, the lower arm bones, and with the outlines of feet" (Anderson and Dibble 1950-54, Bk. 2: 69).

In their paper on the Southern Cult, Waring and Holder (1945) illustrate several variations on the hand and eye motif (Fig. 1). The eye is occasionally replaced by a cross in a circle or by an ellipsoidal to rectangular element. These forms usually occur at the palm of a hand which is extended downward, although examples are not wholly lacking in which the back of the hand is shown or the hand is opened upward (Moore 1905, Figs. 7, 173).

The hand and eye design in Mexico cited by Moore is shown in Figure 1 *d*. It is from the Lienzo de Tlaxcala — again Tlaxcala appears as a place where the hand is emphasized in Southeastern fashion — and dates from shortly after the Spanish Conquest. A shield is depicted, decorated as a grotesque face. Two detached hands are placed over the area of the eyes in such a way that an eye is showing through the palm of the each hand. The hands are extended upward, not downward as is usually the case in the Southeast.

Additional examples occur of this Mexican version of the hand and eye motif. On a stone *teponaztli* (drum) in the Museo Nacional, horizonally extended hands appear on a grotesque face (Fig. 3 *a*). The hands overlie the eyes, which show through the palm of each. A tenoned stone hacha in the Museo de Oaxaca is reproduced as Figure 2. With lid clearly visible, an eye this time is showing through the back of an open hand. Fingers upward, the hand once again is detached and placed against the face at the region of the eye.

A pattern thus existed in Mexico for the hand to be superimposed over some facial feature, with this anatomical feature showing through the hand. In the Mexican codices, numerous examples occur of the hand over the mouth, the outline of the lips appearing against the hand. In some instances the lips and teeth are completely surrounded by the hand (Codex Borgia: 48), in this respect being identical to the eye as illustrated in Figures 1 *d*, 2, and 3 *a*. In other codex portrayals, the indentation of the lips forms part of the hand's profile (Fig. 3 *b*). The latter treatment seems to occur in the art of the Southern Cult (Fig. 3 *c*). Phillips (1940: 356) calls attention to "the hand on jaw" as one similarity between the Southeast and Mexico.

The hand and eye symbol in Aztec Mexico was not restricted to examples in which an eye shows through a superimposed hand. An apparent variant of the motif (Fig. 4), perhaps mainly associated with the earth monster, shows fangs in conjunction with the eyes and locates these profile faces on hands, feet, elbows, and knees. The faces, and particularly the eyes, tend to be so placed as to lie on the wrist and ankle, rather than directly on the palm of the hand or the sole of the foot. Schuster (1951, Figs. 43, 44) illustrates 2 examples of the earth deity whose joints are overlaid with these grotesque faces; similar forms appear in Nicholson (1954, Figs. 3, 4), Proskouriakoff (1954, Fig. 9 *e*), and Peñafiel (1910, Pls. 51, 72, 74). That the nucleated circles at the region of the hands and feet in these representations are to be identified as eyes is indicated by their near identity in treat-

ment to the eyes of the associated skulls. Compare also the eyes in Figure 1 *d*. Moreover, a 16th century French source states: ". . . the goddess of the earth, Tlatechutli . . . had eyes and mouths at every joint, with which she snapped like a savage beast" (Jonghe 1905: 28, quoted in Schuster 1951: 16).

The Aztec wind god Quetzalcoatl is also shown with faces at his knees, a detached eye appearing at each elbow (Schuster 1951: 16; Seler 1902-23; Vol. 2: 955, Fig. 3). The placing of eyes on the elbows corresponds to Figure 3 *d*, from Spiro, Oklahoma. At Spiro it is the forked eye, one of the motifs of the Southern Cult, which overlies the elbow, the eye itself being centered on the elbow joint. The design not only offers a specific correspondence to Mexican material but suggests that, in the eastern United States, an association existed between eyes and joints. Adena designs on the Lakin A and Gaitskill tablets (Figs. 5, 6), which are thought by Webb and Baby (1957) to be the prototype of the hand and eye motif, may be compared. In these designs, nucleated circles occur at the joints of highly stylized figures—apparently at the shoulder, hip, elbow, ankle, and wrist. Rather than being placed at the wrist joints, however, the circles could sometimes be thought of as occurring directly on the "hands" or "bird feet" — an impression which is especially pronounced in Figure 6. "Hands" are extended upward. It may be noted that the use of nucleated circles in the Adena designs offers another correspondence to Mexican art forms (compare Figs. 1 *d*, 4, 5, 6). Finally, mention may be made of a nucleated circle silhouetted at the "palm" area of a sheet mica eagle foot in Hopewellian art (Shetrone 1930, Fig. 62). While the sample is small, the available data suggest the possibility that, in the eastern United States, there was a late substitution of the realistic eye for the nucleated circle as a marking to be associated with joints or hands. In earlier times, perhaps, the emphasis was on the marking of joints, in Cult art on the direct association of the hand and eye. Willey (1948) discusses other treatments accorded the back of the hand, knuckles, and wrist on a pre-Cult horizon in the Southeast. It would seem that considerable elaboration of art motifs may have been taking place, rather than a simple linear development.

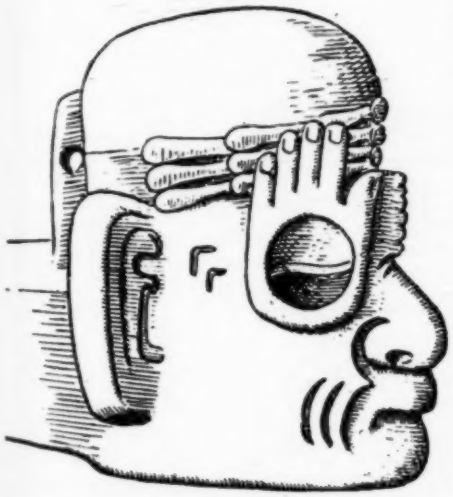

FIG. 2. Thin stone head or hacha, Oaxaca (?) (after Seler 1902-23, Vol. 2:363, Fig. 110 *a*).

A nucleated circle, composed of rather widely spaced concentric lines, occurs frequently in connection with the hand in Maya hieroglyphs. The element usually appears on the back of the hand, at the area of the wrist (Fig. 3 *e*). Occasionally, however, the design is shifted to the back, or possibly the palm, of an extended hand (Fig. 3 *f*). Correspondences with these glyphs may be noted in the eastern United States, that is, the Adena joint markings and the Cult hand and eye motif. (In the latter connection, compare especially variations on the order of Brown 1926, Fig. 279.) The normal position of the circle at the wrist in the Maya glyphs suggests that a joint mark may have been the basic concept, rather than a marking on the upper part of the hand. Nucleated circles are present both in the Adena and Maya motifs. Comparisons, then, are closer to Adena than to the hand and eye in the Southern Cult.

Within Mesoamerica as a whole, the basic forms of the Maya hieroglyphs were established on a horizon considerably preceding known occurrences of the hand and eye motif. The marking of a wrist with a nucleated circle is present in a sizable body of glyphs. It might be argued, therefore, that in Mesoamerica wrist markings were earlier than the direct association of the hand and eye, at least as a favored art form. In any event, extant examples of the

hand and eye motif apparently cluster on a late (Aztec) horizon; the earliest illustrated (Fig. 2) presumably dates from the Classic period. Tenoned and sometimes perforated or portraying the skull, the Oaxaca type of hacha seen in Figure 2 tends to have specialized features provisionally associated with Late Classic horizons (Proskouriakoff 1954: 79-80; Seler 1902-23, Vol. 2: 363, Figs. 105-110 *b*).

It has been seen, in the art of both Mexico and the Southern Cult, that at times the hand was superimposed on some portion of the face, so that the eye or the mouth showed through the hand. A partial analogy is suggested in another Maya glyph (Fig. 3 *g*), where a hand is so placed on the jaw that the outline of the thumb coincides with that of the lower lip (compare Fig. 3 *b, c*). Thompson (1950: 132) points out that in this glyph (zero or completion) the hand is connected with death, thereby corresponding to its association in Mexico — as also in the Southeast. The association of death elements with a hand having ellipsoidal markings is also present in the glyph reproduced in Figure 3 *f* (compare Thompson 1950, caption to Fig 5, 43-5).

As indicated, the encircled cross substitutes for the eye at the palm of the hand in certain Southeastern designs (Fig. 1 *c*). Partially comparable forms exist in Maya hieroglyphic inscriptions and art. (1) Clenched hands occur with crossed bands set against the palm (Fig. 7 *a*; Thompson 1950: 40, Fig. 51, 4). Not only is the hand clenched and held upward, thereby differing from Southeastern examples, but the X-shaped design formed by the crossed bands differs in detail from the cross-in-circle. (2) In the Maya glyph for west, the kin (sun) sign sometimes appears as an infix in the hand (Fig. 7 *b, c*; Thompson 1950: 251, Fig. 41, *18, 19, 21, 33*). Again the hand is clenched. Moreover, the kin element appears at the back of the hand, toward the wrist, rather than in the palm. In Figure 7 *c*, however, the variant of

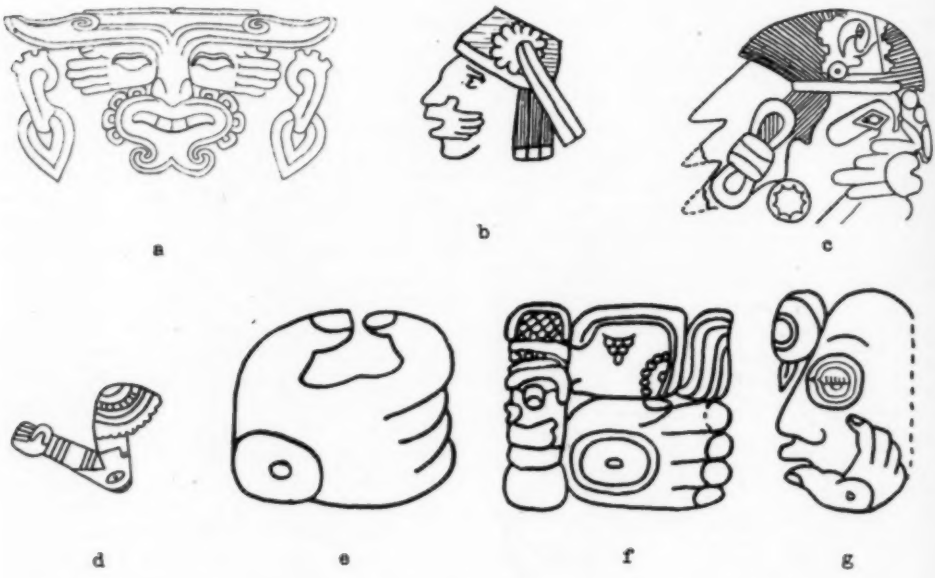

FIG. 3. *a*, sculptured face, identified as Aztec god Macuilxóchitl (after Castañeda and Mendoza 1933, Pl. 13); *b*, head of the Mexican god Macuiltochtli (after Seler 1902-23, Vol. 2:488, Fig. 37); *c*, head of a sheet copper eagle, Dunklin County, Missouri (after Moorehead 1932, Fig. 8 *a*); *d*, arm of human figure on engraved shell gorget, Spiro, Oklahoma (after Burnett and Clemens 1945, Pl. 60); *e*, Maya day sign Manik, Chichén Itzá, Yucatán (after Thompson 1950, Fig. 7, *44*); *f*, Maya glyph (prefix with haab completed), Piedras Negras, Guatemala (after Thompson 1950, Fig. 5, 43); *g*, Maya glyph for completion, Copán, Honduras (after Thompson 1950, Fig. 25, 39).

FIG. 4. Sculptured Aztec earth monster (after Covarrubias 1954, Fig. 8).

the kin sign somewhat approaches the Southeastern cross-in-circle in appearance (Fig. 1 *c*). It is apparent that the correspondences just cited are not truly specific ones. Their function (glyphic versus more purely decorative or, at best, grossly symbolic) is of course in sharp contrast. In the various designs, nevertheless, the hand is associated with perhaps related elements: a so-called "comic symbol" (Fig. 1 *c*), sun sign (Fig. 7 *b*, *c*), and possible segment of an astronomical band (Fig. 7 *a*). Conceivably, then, there could be a common concept involved which finds expression in these somewhat divergent forms.

Figure 8 illustrates a compound wooden mask of the Kwakiutl Indians, from the Northwest Coast. To the left, attached to an arm, a 4-fingered hand extends upward. At the palm of the hand is a rectangular element with rounded corners, very comparable in appearance to that found in identical position in the art of the Southern Cult (Fig. 1 *b*). To the right appears an element which may be an eye in the palm (or back) of the hand. The hand is so placed that the supposed eye occurs over the region in which the mask's eye would normally appear. If an eye is actually depicted this placement is striking indeed, in view of the Mexican examples in which an eye shows through a superimposed hand (Figs. 1 *d*, 2, 3 *a*). On the other hand, the bent arm with

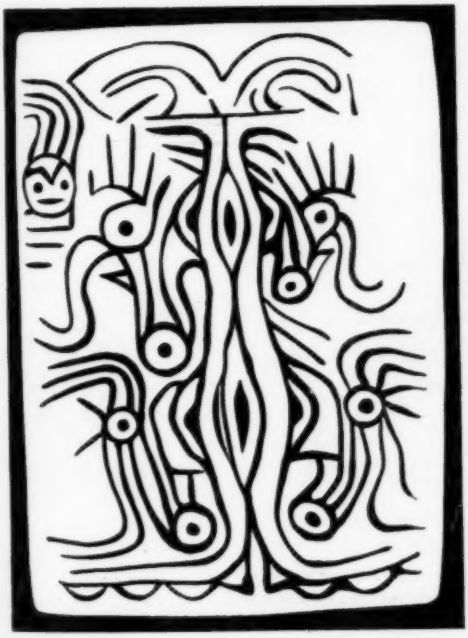

FIG. 5. Lakin A tablet, West Virginia (after Webb and Baby 1957).

FIG. 6. Gaitskill clay tablet, Kentucky (after Webb 1940, Fig. 67).

rounded, boneless appearing elbow finds a close correspondence in the previously cited Adena designs (Figs. 5, 6). Compare the "hocker" motif of Covarrubias (1954: 34, 190, Figs. 5-9, 51-5).

A brief consideration of certain aspects of Northwest Coast art may be in order, in view of the correspondences between the designs shown on the Kwakiutl mask and the hand-eye motif in the Southeast and Mexico. Boas (1927: 253) notes that in Northwest Coast art, "The eye design appears in a variety of forms ranging from a large double eye to a circular pattern with black center." Exemplified in Figure 7 *g*, the latter treatment agrees generally with the supposed eye in Figure 8 and to a design, shown on the foot of a bird, in Figure 7 *d*; compare Boas (1927) Figures 191, 192, 244, 266 *g*. Compare further the nucleated circles which mark bird feet on the Adena tablets (Figs. 5, 6). Boas (1927: 252) also describes the eye design as consisting of "a round or oval field . . . commonly so placed that it corresponds to the location of a joint." Accordingly, it often appears at the wrist, as well as the shoulder, hip, and ankle or, in the case of the whale, at the base of the tail or dorsal fin. As a nucleated circle, the "eye

FIG. 7. *a*, element in headdress, Stela 14, Piedras Negras, Guatemala (after Maler 1901, Pl. 20, 2); *b*, Maya glyph for west, Copan, Honduras (after Thompson 1950, Fig. 41, 33); *c*, Maya glyph for west, Naranjo, Guatemala (after Thompson 1950, Fig. 41, 19); *d* and *e*, Kwakiutl paintings representing the foot of a thunderbird and the foot of a raven (after Boas 1927, Figs, 251, 253); *f*, head of a sheet copper "eagle dancer," Etowah, Georgia (after Moorehead 1932, Fig. 15); *g*, Haida painting representing a shark head (after Boas 1927, Fig. 232).

design" is sometimes considered to be a cross section of the ball and socket joint (Fig. 7 *d*). The "eye design" is not only substituted for the joint (Fig. 7 *e*) but occurs in the mouth of an animal, at the tail or wings of birds, and as decorative fillers (Boas 1927: 158, 204, 252-3).

The so-called eye appears, therefore, in a wide variety of contexts in the art of the Northwest Coast, and once a process of elaboration such as would tend to bring this about was under way, it might be a fairly simple matter for the design to be shifted from the wrist joint to an area roughly centered on the palm of the hand. Such a development would parallel that suggested above for corresponding motifs in the Maya hieroglyphs and the eastern United States. To be sure, a sequence of dated art forms has not been demonstrated to support either the Northwest Coast or the Mayan reconstruction. The evidence, such as it is, is based upon the relative frequency of the forms, coupled with the assumption that divergent designs represent innovations rather than being survivals from the past. Clearly, converging developments in the 3 areas cannot be ruled out. Be all this as it may, it is not highly unusual to find the "eye design" in Northwest Coast art centered on the palm or back of the hand instead of on the wrist joint. (Fig. 9 *a*; Boas 1927, Figs. 200, *16*, 201, *45*, *49*, 274, 275, 277, 278, 280 *a*).

In view of the great variation in the "eye design" on the Northwest Coast, it should be noted that thoroughly typical eyes occasionally appear on hands or claws (Fig. 7 *e*). In the painted Tlingit box illustrated in Figure 9 *a*, the treatment of the eye as such and of the "eyes" at the palms of the hands is virtually identical. Resemblance to the ellipse at the palm of one of the hands, observer's left in Figure 8, is likewise to be noted. Compare also the Maya glyph in Figure 3 *f*, although there is no reason for supposing that these concentric markings indicate an eye. Following Collins (1937: 298), Drucker (1955: 63) has compared the "rectangular elements with rounded corners often referred to as 'eye' elements in discussions of Northwest Coast art" to "the oval 'eye' elements of Old Bering Sea" Eskimo art, as well as to similar stylistic concepts found in China during the Shang and Early Chou dynasties. Whatever the various explanations may be for these far-flung resemblances, the motif in question figures prominently in the art of the Northwest Coast, at times taking on indubitable aspects of the open eye on the open hand.

A conclusion that the Northwest Coast similarities with the Southeast are fortuitous, the result of convergence, could derive support from the symbolism of the mask shown in Figure 8. This symbolism strikes a very different note from the "Death" Cult. Boas (1897: 357, 358) states that the mask represents an ancestor, "in a pleasant state of mind," dispensing gifts at the potlatch. To be sure, this argument presupposes that the symbolism of the mask as a whole is related to the concepts embodied in the various component designs, a position perhaps difficult to maintain in view of the ubiquitous nature of the "eye" motif.

A strengthening of the case for historical relationships among the hand and eye motifs in the Southeast, Mesoamerica, and the Northwest Coast would appear to depend, in part, upon the finding of additional artistic correspondences. A number have been previously pointed out for the Southeast and Mexico, although their significance is yet to be fully established. The case is quite different regarding the geographically remote, essentially nonagricultural Northwest Coast. Nevertheless, if one wishes to argue for an historic connection, it is possible to cite additional art forms from

FIG. 8. Compound Kwakiutl mask (after Hodge 1907-10, Pt. 1: 814).

the Northwest Coast which correspond rather closely to motifs present in the Southern Cult. (1) The forked eye (Figs. 7 *g*, 9 *a*). (2) Forked-eye-like elements at the region of the mouth, occurring singly in Cult art at Etowah (Fig. 7 *f*) but as a group in Figure 8. (3) The barred oval or "anus" motif, occurring in many contexts both in Southeastern and Northwest Coast art. In the art of the Southern Cult the barred oval appears under the tail and on the wings of a bird (Fig. 9 *b*), while on the Northwest Coast a similar design occurs in almost identical position, at the wings (Fig. 9 *c*) or wings and tail feathers (Fig. 10). Nevertheless, the "barred oval" of the Northwest Coast may be a variant of the "eye," perhaps substituting for it as a joint (Boas 1927: 204, 253, Figs. 193, 244) and thereby apparently enhancing the likelihood of convergence.

In the foregoing comparative comments, attention has been paid not only to the realistically treated eye but to the nucleated circle. Like the eye, this element is sometimes closely associated with the hand. It occurs on hands

FIG. 9. *a*, painted Tlingit box (after Boas 1927, Fig. 276); *b*, woodpecker, Moundville, Alabama (after Waring and Holder 1945, Fig. 4 *e*); *c*, Tsimshian painting representing an eagle (after Boas 1927, Fig. 241).

FIG. 10. Haida tattooing representing a duck (after Boas 1927, Fig. 226).

as a definite representation of the eye in Figures 1 *d*, 4, and perhaps 8, from Mexico and the Northwest Coast. It appears extensively at the region of the wrist in the Maya hieroglyphs and Northwest Coast art, sporadic examples being centered at the palm or back of the hand. Again associated with hands or bird feet, the nucleated circle is also present in Adena and Hopewell art. In view of the apparently important relationship of this element to the hand and eye motif, per se, it is perhaps worth noting that stylistically different concentric circles or volutes occur in Anasazi art of the Southwestern United States, as one of a number of emphases given the palm of the hand (Haury 1945: 24, 65, Pl. 33 *a*).

Various correspondences have been cited in the art of the Southeastern United States, central Mexico, the Maya, and the Northwest Coast. Major motifs discussed have concerned the association of the palm of the hand with the eye, nucleated circle, cross, and ellipsoidal field; the superimposition of the hand over the eye and mouth in such a fashion that these facial features show through the hand; and the association of the hand with elements suggesting death. Not all of these motifs, of course, have been traced in every area. Nevertheless, a corresponding shift in several areas, whereby the nucleated circle or eye was moved from the wrist joint to the palm of the hand, has been hinted at. Miscellaneous comparisons have been made between the art of the Southern Cult and that of the Northwest Coast. On the other hand, no attention has been given the vast body of partially corresponding art forms from other parts of the world assembled by Schuster (1951, 1952) and Covarrubias (1954). Clearly, any final conclusions must take cognizance of this material. At the moment, however, it seems useful to focus the discussion somewhat more sharply.

While it would be desirable to offer even tentative conclusions which would sum up these widely dispersed data, this is obviously an impossibility at the present time. It may well be significant that the correspondences which have been noted exist as sporadic motifs rather than as integrated styles. Stylistic factors have empirically proven more reliable than motifs as criteria for tracing precise time-space relationships. It is not completely clear, however, if this is due primarily to a tendency for motifs to diffuse more readily and hence more widely than integrated art styles, to persist over longer stretches of time (in which case derivation from a common ancestral culture may be involved), or to be more readily duplicated (independent invention). While all these tendencies may conceivably hold true, this does not aid us much in the solution of a particular, historically oriented problem. The most which can be attempted, then, is a glance at the possible implications of the correspondences which have been presented. These implications vary according to the different assumptions which might be made.

1. If the existence of diffusion from Mesoamerica is assumed as an explanation of the correspondences, the data may bear on the ancestry of certain elements which go into the Southern Cult — particularly those regarding the hand and perhaps death motifs. At this stage, of course, the possibility cannot be ruled out that the motifs were carried in the opposite direction, from the Southeast to Mesoamerica.

2. If it is assumed that diffusion occurred between the Southeast or Mexican regions and the Northwest Coast, problems of considerable importance for an understanding of cultural growth in the latter area would be raised. This assumption, of course, is out of keeping with the usual view regarding the place of the Northwest Coast in American prehistory.

3. If connections between the hand and eye or related motifs in the Southeast, Mesoamerica, and the Northwest Coast are assumed to exist, this need not mean that direct diffusion

was involved. We could, instead, be dealing with religious concepts which were widespread on an early horizon in America and which, perhaps, may have crystallized out under certain conditions of artistic climax. Material from the early Adena and Hopewell horizons may be of significance in this regard.

4. If it should eventually be established that no historical connections, direct or indirect, are involved, the correspondences which have been examined would not be lacking in significance. They would still derive importance as a striking reminder of the extent to which parallel or converging developments may sometimes go. Even were it to be demonstrated that certain fundamental artistic concepts were diffused at an early date, the possibility would need to be explored that some of the correspondences noted herein may have arisen independently of one another, as secondary elaborations of the original, historically linked elements.

ANDERSON, A. J. AND C. E. DIBBLE (EDITORS)

1950-54 Florentine Codex, General History of the Things of New Spain, Fray Bernardino de Sahagún. *Monographs of The School of American Research*, No. 14, Pts. 2-4, 8, 9. Santa Fe.

BOAS, FRANZ

1897 The Social Organization and the Secret Societies of the Kwakiutl Indians. *Report of the U.S. National Museum for 1895*, pp. 311-738. Washington.

1927 Primitive Art. *Instituttet for Sammenlignende Kulturforskning*, Series B, Vol. 8. H. Aschehoug, Oslo.

BROWN, C. S.

1926 *Archaeology of Mississippi*. Mississippi Geological Survey. University.

BURNETT, E. K. AND F. E. CLEMENTS

1945 The Spiro Mound Collection in the Museum. Historical Sketch of the Spiro Mound. *Contributions from the Museum of the American Indian, Heye Foundation*, Vol. 14. New York.

CASTAÑEDA, DANIEL AND V. T. MENDOZA

1933 Los huehuetls en las civilizaciones precortesianas. *Anales del Museo Nacional de Arqueología, Historia y Etnografía*, Ép. 4a, Vol. 8, No. 2, pp. 287-310. Mexico.

CODEX BORGIA

1937 *Códice Borgia. Manuscrito pictorico mexicano*. Mexico.

COLLINS, H. B., JR.

1937 Archeology of St. Lawrence Island. *Smithsonian Miscellaneous Collections*, Vol. 96, No. 1. Washington.

COVARRUBIAS, MIGUEL

1954 *The Eagle, the Jaguar, and the Serpent. Indian Art of the Americas*. Knopf, New York.

DRUCKER, PHILIP

1955 Sources of Northwest Coast Culture. In "New Interpretations of Aboriginal American Culture History," *75th Anniversary Volume of the Anthropological Society of Washington*, pp. 59-81. Washington.

GRIFFIN, J. B.

1949 Meso-American and the Southeast: A Commentary. In *The Florida Indian and His Neighbors*, edited by John W. Griffin, pp. 77-99. Winter Park.

HAURY, E. W.

1945 Painted Cave, Northeastern Arizona. *Amerind Foundation*, No. 3. Dragoon.

HODGE, F. W. (EDITOR)

1907-10 Handbook of American Indians North of Mexico. *Bureau of American Ethnology, Bulletin* 30. 2 pts. Washington.

JONGHE, ÉDOUARD DE

1905 Histoyre du Mechique; manuscrit français inédit du XVIe siècle. *Journal de lo Société des Américanistes de Paris*, Series 2, Vol. 2, No. 1, pp. 1-41. Paris.

MALER, TEOBERT

1901 Researches in the Central Portion of the Usumatsintla Valley. *Memoirs of the Peabody Museum, Harvard University*, Vol. 2, No. 1. Cambridge.

MARQUINA, IGNACIO

1951 Arquitectura prehispánica. *Memorias del Instituto Nacional de Antropología e Historia*, No. 1. Mexico.

MOORE, C. B.

1905 Certain Aboriginal Remains of the Black Warrior River. *Journal of the Academy of Natural Sciences of Philadelphia*, Vol. 13, pp. 125-244.

1907 Moundville Revisited. *Journal of the Academy of Natural Sciences of Philadelphia*, Vol. 13, pp. 336-405.

MOOREHEAD, W. K.

1932 *Exploration of the Etowah Site of Georgia*. Department of Archaeology, Phillips Academy, Andover, Mass. Yale University Press, New Haven.

NICHOLSON, H. B.

1954 The Birth of the Smoking Mirror. *Archaeology*, Vol. 7, No. 3, pp. 164-70. Cambridge.

NOGUERA, EDUARDO

1927 Los altares de sacrificio de Tizatlán, Tlaxcala. *Publicaciones de la Secretaría de Educación Publica*, Vol. 15, No. 11. Mexico.

PEÑAFIEL, ANTONIO

1910 *Destrucción del templo mayor de Mexico antiguo*. Secretaría de Fomento, Mexico.

PHILLIPS, PHILIP

1940 Middle American Influences on the Archaeology of the Southeastern United States. In *The Maya and Their Neighbors*, edited by C. L. Hay and others, pp. 349-67. D. Appleton-Century, New York.

PROSKOURIAKOFF, TATIANA

1954 Varieties of Classic Central Veracruz Sculpture. *Carnegie Institution of Washington, Publication 606, Contributions to American Anthropology and History*, No. 58, pp. 61-121. Washington.

SCHUSTER, CARL

1951 Joint-Marks: A Possible Index of Cultural Contact between America, Oceania and the Far East. *Mededeling* No. 94, *Afdeling Culturele en Physische Anthropologie*, No. 39. Koninklijk instituut voor de Tropen, Amsterdam.

1952 A Survival of the Eurasiatic Animal Style in Modern Alaskan Eskimo Art. In "Indian Tribes of Aboriginal America," edited by Sol Tax, pp. 35-45. *Selected Papers of the XXIXth International Congress of Americanists* [New York, 1949]. University of Chicago Press, Chicago.

SELER, EDUARD

1902-23 *Gesammelte Abhandlungen zur amerikanischen Sprach-und Alterthumskunde*. 5 vols. Berlin.

SHETRONE, H. C.

1930 *The Mound-Builders*. D. Appleton, New York.

THOMPSON, J. E. S.

1950 Maya Hieroglyphic Writing: Introduction. *Carnegie Institution of Washington, Publication* 589. Washington.

WARING, A. J., JR., AND PRESTON HOLDER

1945 A Prehistoric Ceremonial Complex in the Southeastern United States. *American Anthropologist*, Vol. 47, No. 1, pp. 1-34. Menasha.

WEBB, W. S.

1940 The Wright Mounds: Sites 6 and 7, Montgomery County, Kentucky. *University of Kentucky Reports in Anthropology*, Vol. 5, No. 1. Lexington.

WEBB, W. S. AND R. S. BABY

1957 The Adena People, revised. *Papers in Archaeology of the Ohio Historical Society*. Columbus. (In press.)

WILLEY, G. R.

1948 A Prototype for the Southern Cult. *American Antiquity*, Vol. 13, No. 4, pp. 328-30. Menasha.

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July, 1955

THE PRE-COLUMBIAN STONECUTTING TECHNIQUES OF THE MEXICAN PLATEAU

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ALTHOUGH the problem of stonecutting techniques is but one key to understanding the civilizations of the Middle American people, it is through their stonework that they left their greatest mark and in order to fully appreciate the organization and magnitude of their achievements, we must examine this aspect. To this end the author, who is by training and experience a mechanical engineer, attempted to check in various centers in Mexico on the feasibility of estimating the man years required to build various monuments in order to test hypotheses concerning techniques of construction. It appeared that it might be possible to approach certain aspects of early ruins from this purely technological point of view and perhaps throw some light on the social, technical, and economic background of their builders.

The difficulties of building in those days were immense, as the builders lacked metal tools that were fundamental in similar work done elsewhere. In addition to this, the locations where building was done were usually isolated from the rest of the country except for land communication, so it is probable that the areas adjacent to the site had to supply all the materials that were needed for its construction. This, however, did not deter the builders and an examination was made of some of the temples in Central Mexico to determine, if possible, the techniques that were used in the erection and shaping of the materials.

Several monumental centers were visited but of them only three seemed really to be first class engineering projects — Malinalco, Xochicalco, and Mitla. All the others which I inspected were composed either of large mounds of smaller stones or had but few carvings or examples of stonecutting. As such, these would indicate an expenditure of energy rather than a disciplined display of technique. Each of these 3 monuments, which are described in detail and fully illustrated by Ignacio Marquina (1951), is made of completely different materials, each is heavily ornamented in its own way, and each has similar remoteness and sparseness of available raw material. They form an unusually similar group in many respects though their differences serve to show the great versatility, knowledge, and energy of the early stonecutters.

Malinalco. The first of these 3 sites visited was Malinalco in the State of Mexico. It is peculiarly located, well up the side of a mountain, and only accessible by one narrow trail which must have accommodated the workers and all supplies. The main feature of the site is its monolithic temple in the construction of which about 1,600,000 kg. of living rock have been excavated and delicately removed to leave the main temple chamber, decorative statues and staircases, as well as part of another building. The rest of the monument was made of smaller stones, debris from the monolith, and earth, forming mounds and chambers on the same mountain ledge.

The foundation and structure of Malinalco is of volcanic ash containing clay and it appears that it is the properties of this stone that have largely determined the location and method of construction. The stone has the property of absorbing a large quantity of water and becoming dramatically soft and friable when wet. When it is dry it is quite hard and relatively intractable. This immediately suggests the method of construction, and it appears that the temple is located where it is because of the unusual combination of a solid shelf of this ash with horizontal strata and a spring of water flowing directly above it.

The spring showed no signs of flowing despite its being the rainy season when the monument was observed, but as the climate on the Mexican plateau was much wetter in the years 1400-1500 than at the present time (Sears 1952),

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it is reasonable to suppose that it was flowing then and that the structure was built then, confirming the suspected period of construction (Marquina 1951). This spring was essential in the construction of the monolith and a series of channels had been dug from it to lead to the various parts of the main buildings where it was distributed through a further set of channels to the various parts of the working face. The water would be held in place by smaller dams perhaps pegged by the series of holes shown in Figure 1. To the right in Figure 1 can be seen a deep channel around the main chamber of the monolith which does not communicate with it. This was probably to hold water and permit it to thoroughly permeate the stone in the vicinity of the chamber. A small channel was arranged to permit the interior to be flooded with water to wash out the debris. This channel also acted to prevent water from spilling into the main chamber and spoiling the statuary in the event of an exceptional downpour.

The total volume of virgin stone removed in the construction was about 900 cu. m., and as the rock becomes so soft when soaked, it is reasonable to suppose that stone or wood mattocks would have been used in the initial phases of the work. Marks of this type of tool can be found in the channels leading from the spring. As the work progressed, a less rough method would be needed to give the work the beautiful finish that it has and other tools would be used for this purpose.

Near the site were found several hundred cylindrical stones about 10 cm. in diameter and 20 cm. long. They are of 2 varieties, shown in Figure 2: about 75% of volcanic scoria and the remainder of compacted, sedimented silt composed of clay, lava particles, and sand. They weigh 1 to 2 kg. each and are very conveniently shaped for use as hand tools. They are particularly effective as tools, since the sharp edge of the scoria readily cuts and removes the wet stone and its unusually porous nature prevents clogging. This material which abounds in the region seems ideal for tools; though these objects may have been used as ornamentation, the author feels sure that their primary purpose was as tools for finishing the

FIG. 1. View of the upper monolith at Malinalco, showing the channel around the upper part of the chamber.

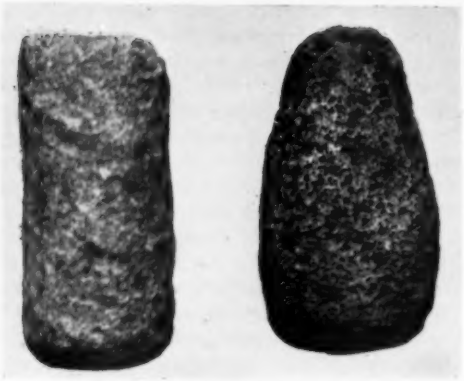

FIG. 2. Scraping stones from Malinalco. *Left*, of siltstone; *right*, of scoria.

stone in the monuments. The other tools of silt also would have been valuable as particles of lava protrude from them and make a good abrasive against the rock. I believe that Malinalco is the only temple where scoria cylinders have been found in such numbers, and it may be that the coming of the Spaniards (Marquina 1951) caused the people to abandon the tools that they appear to have carefully collected at other sites.

The combination of using mattocks with these scoria tools would have permitted the rapid removal of stone; to get a rough idea of the magnitude of the construction task, we might put a mean value of about 1 man hour to remove 750 c.c. of stone. This value, of course, would vary as the delicacy of work changed, but in order to get an idea of the task, this seems a reasonable average figure to use with such soft material. If we also assume a 10-hour working day and a 300-day working year, this gives us an estimate of 400 man-years to build Malinalco, excluding the time needed for painting, tool making, and so on. This approximation shows that the task might have been done over an 8-year period by a crew of 50 men. This is about the maximum number of men that could be usefully employed on the shelf without getting in each other's way, and it appears that the over-all task should have taken about 10 years.

Water was needed to soften the stone and channels were dug to bring it to the working area, but when the working was over, it was necessary to divert it, and several additional channels were dug to carry the stream away from the building after it was completed. Small dams, still in place, were installed to make the water flow innocuously around the cliff edge and fall into the valley well clear of the work.

The mode of stonecutting described above is peculiarly adapted to Malinalco as its monolithic construction allows the use of a water softening technique. It demonstrates one way of cutting stone with available materials. This is the only monument that I saw made of this type of stone and it indicates a flexibility of organization prepared to locate a temple in a seemingly awkward place and take advantage of this fact.

Xochicalco. The temple of Xochicalco is completely different from Malinalco and is again carefully described by Marquina (1951). It is near the top of a hill surrounded by other monuments and dwellings, overlooking a deep gorge. However, the pyramid here is almost the only structure in this area displaying either cut stone or reliefs, as the other buildings are nearly all composed of smaller stones combined with earth. The temple has been extensively restored and many stones are missing, but the lower 2 tiers of stones are substantially intact all the way around the structure and sufficient of the rest is visible to give a good idea of the extent of the stonecutting, as well as enabling one to visualize the intricate reliefs in the detail that they deserve.

The temple consisted originally, if we assume that the original structure was completely faced and paved, of about 1200 carefully finished and fitted andesitic-porphry stones. The largest of the stones has a volume of 2 cu. m. and weighs about 4500 kg. The average size of the stones is less than this and the facing stones appear to average about 200 kg. each. They were erected in such a way as to permit the shell to stand by itself before being filled and the stones seemed to mate exactly not only on the surface but along their sides projecting into the pyramid. There seems to be no instance where the builders permitted themselves the liberty of filling surface voids with smaller stones, and indeed, there are many instances of mating stones being "stepped" into each other to permit somewhat irregularly shaped stones to be used. This is a very complicated task even using modern equipment, and using

the limited facilities at the disposal of the builders it is almost incredible.

It was noted that where flat surfaces were intended, they were made with no curvature or waviness that could be measured with a hand scale placed in contact with the stones; nor could any tool marks or directionality be detected on the surface even when wetted. This is a particularly surprising circumstance as the stone is hard and dense. In addition the facing is carved and relieved to a maximum depth of 12 cm., with an average depth of 5 cm., and with superficial grooves used to accentuate the outline. The surface at the bottom of the relieved portion is approximately smooth but somewhat more lumpy than that of the flat stone faces. The smaller superficial grooves do not seem to have been abraded along their lengths as there are occasional discontinuities along them.

Perhaps the most outstanding feature of the pyramid is the symmetry not only of the building but of the carvings on it. Both sides are essentially the same, with the feathered, convoluted serpents stretching back in close dimensional relationship to those on the opposite side. The rectangular construction coupled with this similarity of pattern suggests that the pyramid might have been constructed in complete symmetry with the stones for all 4 corners and sides cut and relieved to exactly the same size and shape. This would have made a much simpler task of carving, cutting, and assembling if it had been technically possible to introduce standardization and accurate measurement with the tools used. A careful survey of the blocks around the base of the pyramid was made to determine whether or not this had been done. It was definitely not the case; there is little correspondence in size between similarly situated stones and, indeed, the number of stones along the base of each side is different. This is a strong indication that the pyramid was constructed progressively from one corner with the stones being mated to those in situ and cut to be accommodated to the earlier stones.

This assumption of progressive construction is also satisfied by the apparent fact that the pyramid was built of irregular stones carefully fitted together. This would hardly have been done without having all facilities including the raw stone at hand and could hardly have been done without depositing a much greater quantity of chips around the pyramid than were observed. These factors taken together seem to point to the work being done at the quarry.

With this in mind, I made a considerable effort to find this quarry. Near the pyramid there was a waterworn stone so a trail was followed in a westerly direction down to the river. About 400 m. east-northeast from the pyramid a cut stone was observed lying by this trail, obviously of the same size and shape as those in the upper edge of the pyramid. It indicated that this trail was probably the correct one but it was not possible under the circumstances to pursue it any further. An examination was also made due west of the pyramid but the quarry was not found. An examination of aerial photographs of the complete site indicated that the quarry might be in one of 3 areas: (a) down by the river to the northeast, (b) in a draw 3 miles west, (c) down by the river due north.

The techniques of cutting, shaping, and carving in relief would be much clearer on seeing the quarry. This is particularly true in regard to the cutting. Several methods of dressing the stone have been tried experimentally, and, I believe, the actual technique used has been found: when 2 stones of the same material as those in the pyramid are rubbed and tapped together dry, the surfaces shatter and leave much the same pock-marked appearance as that of the flat area on the pyramid itself. With continued manual pounding a flat regular surface is easily produced. This method was pursued quantitatively and about 70 c.c. of stone per hour was abraded and crumbled off each piece of stone when rubbed and tapped together by hand. This was, of course, done under ideal conditions so that if we assume that 35 c.c. of stone was removed per hour in the actual work operation we will perhaps have a valid approximation. The total volume of dressed stone in the pyramid is about 360 cu. m., and if we assume that the waste was about 30% of the total then we obtain an estimate of 3,000,000 man-hours for the stone dressing. Again assuming a 10 hour working day and 300 working days per year, the stone dressing would need 1000 man-years or a crew of 200 men for 5 years.

This estimate refers only to the actual stone shaping but seems wholly within the bounds

of credibility thereby tending to confirm the suggested method. The actual relief carving would have been tedious, of course, but it seems that no other material was needed for tools since an appearance similar to the bottom surfaces of the reliefs can be obtained by abrading a stone block with another of the same material. This pyramid, like the temple at Malinalco, shows the versatility of the ancient peoples in using a technique based on their knowledge of local materials and adapted to them. They were undaunted by the adamantine rock and used its hardness to their advantage in constructing this durable and intricate monument.

Mitla. Mitla, in Oaxaca, the third of the trio, is in a completely different situation from the other two. It is located toward the upper end of a fertile valley and built on flat ground near the small Río Mitla, about 1 km. south of the range of high mountains which enclose the valley (Holmes 1895; Marquina 1951).

Mitla is not a large site but it enjoys many distinctions. Parts of it are in a beautiful state of preservation and, though unroofed, many of the larger stones are still in position and portions of the mosaics are exactly as they were built. Since the stones of these mosaics have not been moved they retain the sharp outlines that they originally had.

The scale of construction at Mitla is staggering. There are about 300,000 pieces of stone mosaic, each stone about 20 by 15 by 5 cm., and about 100,000 larger stones including at least 50 items of over 10,000 kg. in weight. The largest is a giant of about 18,000 kg. All these larger stones are in the form of pillars or doorway lintels, raised well off the ground. The mosaics were finished in front and on all 4 sides but were left uncut on the backs which were set into the central earth body of the walls.

One of the most important tasks here, as at Xochicalco, was to locate the quarry in order to learn the technique used to take out the stones and examine the tools, toolmarks, and other remains of interest. Two locations that had obviously been used as quarries (Holmes 1895) were visited. One is on a mountain top about 8 km. east of the ruins and the other about 3 km. east-northeast of the ruins at the foot of a cliff where large boulders are still lying. There is definite evidence of cutting of larger stones in both these areas, and the presence of pointed flint tools nearby suggests how the rock might have been chipped and pecked out (Holmes 1895). There is however an anomaly in the quarries being located where they were first discovered and it might be significant to examine this.

In order to drag the larger stones to the building site it must have been necessary to use the stunted timber available and rope made of local fiber. The trees near Mitla could have been used to make a sledge on which to drag the stone but probably would have been unsuitable for rollers, so we can be reasonably sure that the building stone was dragged on some sort of sledge. If this were the case and we consider average values of ground friction we find that a pull of about 7000 kg. is needed to pull the largest stone along the level. The local fiber was tested and showed a strength of 1.8 gm. per denier as against 4 for sisal and 6 for manila. This implies that a ¾-inch rope (probably the most practical size for hand weaving) of this material would take a tensile load of only 200 kg. of rope. This implies a task force of about 200 men using 800 m. or about 250 kg. of rope. This seems a formidable and expensive effort to bring stones from the mountain top to the site, an effort that is markedly greater than indicated when it is appreciated that the Río Mitla itself had to be forded.

This task is, of course, not insuperable, but its magnitude suggests that with the same stone as abundant as it is in the neighborhood, perhaps a much closer quarry would have been advantageous. With this in mind I skirted the entire area and it seems likely that the hill directly behind the ruins was originally used as the main quarry. This is now a low slope with bedrock just below the surface and it is crowned with odd shaped boulders that may be the remains of pieces broken off and left. The crest of the hill would have been higher when the building was started, the whole crown seemingly having been removed. This location would have greatly reduced the labor of haulage and supply to the monuments and would have provided a gentle downhill slope all the way. Even now there appear to be traces of an old road curving to the ruins from the bottom of a gully to the west of this slope and across the bottom of it.

The stone used in the construction of the ruins is a badly weathered trachyte (Holmes 1895) which has neither the adamantine qualities of that at Xochicalco nor the softenability of that at Malinalco. It stands weather well and can be easily chipped with flint tools but does not lend itself at all to being split like slate. This latter point is the more remarkable as there are so many relatively thin, flat, parallel sided pieces composing the mosaic and a cleavable stone would lend itself ideally to this type of construction.

In the mosaic itself there are several areas of exactly similar patterns that are built up either of a single larger stone with its face cut to conform to the steps of the mosaic or of a number of smaller stones fitted together to form the identical pattern. This leads one immediately to the speculation that there was little difference in the amount of work needed in the 2 cases. It would be very surprising indeed if the material was pecked down by hammering to the flat shapes that occur; rather it is indicated that the builders had at their disposal a method of sawing the stone. In addition to this, it seems from the way that the mosaics are fitted together (Holmes 1895) they must have been shaped, cut, and grooved while being assembled. This implies a portable saw.

At Malinalco and at Xochicalco we saw instances of the size and shape of the stones being dictated by the properties of the stone itself. At Malinalco stone was gouged out of the shelf and at Xochicalco, the large, bulky stones were carefully fitted to minimize the work done. At Mitla we find an example that is exactly the opposite unless we assume sawing was resorted to. The flat plates are absolutely the wrong shape for safe and economical pecking and chiseling but ideal for sawing. The majority of the protruding mosaic forms are also arranged so that they can be sawed off with a minimum number of cuts. The stone is of such a nature as to permit it to be readily sawed with a simple modern hand saw. Unfortunately the problem still remains as to what the builders of Mitla used. It is believed that they had no metal tools and in an effort to find the correct combination of materials the author has tried many different methods but without success. The necessity for sawing becomes apparent when we consider the actual man-hours required to build the structures. If we assume a period of 20 years of constant effort, it would require an average of 60 stones to be laid each day to complete the buildings. It is probable that the maximum number of effective workers at any time would have been about 400, of which, perhaps, 100 might have been engaged in the actual process of trimming the stone to size. This implies a man-hour allocation of 14 man-hours for the trimming of each stone. This appears too little for percussive methods of trimming and, unless the total period of construction were greatly lengthened, it would appear that sawing by some means was necessary.

Immediately west of the area behind the ruins, where I suspect the main quarry was, and about 300 yards from the church group of the ruins, there is a narrow canyon where a stream flows over the lip of the canyon and down through it, widening and joining the Río Mitla below the ruins. In this canyon I found a large cauldron 125 cm. across and 62 cm. deep, carved out of a boulder and holding water to half its depth. It was located in the top of a large piece of stone that had flaked off of one of the walls of this gully and lay directly below an overhanging ledge. It was quite immovable and so placed that it was not possible to walk around it. It seemed carefully carved with its lips even and horizontal all around and tool marks plainly visible inside it.

The purpose of this cauldron is obscure and its location makes it even more so when we note that it is located near a stream, in a gully, and far from the nearest present habitation. It is, however, located to the immediate west of the area that I suspect as the major quarry and it might be that it was connected with the stonecutting process — particularly as there are traces of a road curving away from the bottom of this blind gully. This theory can be further substantiated when we consider the possible need for such a sturdy vessel to dip stones in for some treatment without risking breakage. The only way that the builders could manufacture a substantially unbreakable cauldron was by hollowing it out of a stone in this manner. It might be that the stones were dipped into some softening agent in the cauldron, allowed to soak, and then cut to size, using the stream to carry away the debris. This suggestion has been pursued and several plentiful chemicals, particularly vinegar and caustic

potash, and urine have been tried, but without success.

The experiments consisted of milling separately in the same ball mill 4 equal portions of the stone from Mitla with similar quantities of the 2 chemicals (vinegar and potash, and urine) as well as dry and only with water, and observing the effect on the fines distribution after milling. The effect in all 4 cases was negligible and it might be reasonably concluded that the effects of acetic acid and caustic potash on the stone is negligible. This of course does not eliminate all chemicals nor does it definitely ensure that the cauldron had no connection with the shaping of the stone. Further work is in progress on this question.

The 3 different types of ruins, each composed of different materials, have been compared as far as available data permits and even this brief discussion shows the versatility and imagination of the builders. More than that it shows they possessed a certain store of knowledge concerning the working of stone that could have been called on in any location. The calculations of the time required to construct a pyramid must have been made at the outset of the design or a finished and integrated whole could not have been produced and, perhaps, if calculations were badly at fault, the gross modification of a started design would be detectable. This feat of engineering is possibly at its most developed form at Xochicalco where the simplicity of design permitted little alteration and the very slow method of stone trimming might have made the period of construction hard to predict. This was surely not the case and the breadth of knowledge of these builders can perhaps be further revealed by a more detailed study of their engineering and constructional techniques.

HOLMES, W. H.

1895 Archaeological Studies among the Ancient Cities of Mexico. *Field Columbian Museum, Anthropological Series*, Vol. 1, No. 1. Chicago.

MARQUINA, IGNACIO

1951 Arquitectura prehispanica. *Memoiria de Instituto Nacional de Antropologia y Historia*, Vol. 1. Mexico.

SEARS, P. B.

1952 The Palynology of Southern North America. I: Archeological Horizons in the Basins of Mexico. *Bulletin of the Geological Society of America*, Vol. 63, No. 3, pp. 241-54. New York.

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A STRATIGRAPHIC TRENCH AT SITIO CONTE, PANAMA*

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UNTIL recently Panamanian archaeology has been essentially descriptive with little attempt at chronological ordering. Outstanding monographs and writings of this nature are those by Holmes (1888), MacCurdy (1911), and Osgood (1935), on the Province of Chiriquí, and Linné (1929) on Darien. In the 1930's the Peabody Museum (Harvard) excavations at Sitio Conte in Coclé Province, central Panama, were devoted largely to the careful uncovering of graves and their contents; but analyses of these collections were not made with an eye to cultural sequence (Lothrop 1937, 1942). During the last 7 years field work has been directed to the problem of temporal relationships of prehistoric cultures in the Coclé and Parita Bay regions. These surveys and excavations have been carried out by the Smithsonian Institution (Stirling 1949, 1950; Willey 1951) and by the Peabody Museum (Willey and McGimsey 1952, 1954; Willey and Stoddard 1954). On the basis of these later investigations a tentative sequence has been worked out for central Panama, beginning with the shellmound Monagrillo culture on the shore of Parita Bay, and after a time gap, or major break in sequence, culminating in the Coclé-like ceramics found throughout the area and dating around the time of the conquest (Table 1).

The present study is concerned primarily with the more recent end of this sequence, in particular with the incidence of Santa María and related midsequence types at the late period Sitio Conte. Although Willey and Stoddard (1954) had noted the presence of Santa María types in Trench XI at Sitio Conte, in levels below Coclé sherds, more detailed study of the Trench XI collections was warranted, both to verify these casual observations and to develop any additional information.

Trench XI, Sitio Conte. Because of the extremely confused stratigraphic conditions at Sitio Conte, as described below, Lothrop believed that extensive stratigraphic treatment was unjustified and concentrated primarily on excavation of the graves and analysis of the burial furniture and ceramics. However, he had Trench XI excavated " . . . in an effort to determine the nature of the stratification and collect samples of the pottery types occurring in each stratum." (Lothrop 1937: 297). The trench, a 20 by 2 m. cut approximately 290 cm. deep runs east-west and lies in the extreme eastern portion of the site. Its eastern end is about 60 m. from the Rio de Coclé and the main area of excavation. Excavated in 1931 under the direction of L. L. Wedlock in 20 1 by 2 m. sections of varying depth, the material was stored at the Peabody Museum in Cambridge where a large portion of it was available for this study. This material has not previously been reported upon in the literature in a detailed manner and represents the only collection of stratigraphically excavated "utility" or midden ceramics from the site.

Stratigraphy. A physical stratigraphy, consisting mainly of 4 layers of clay or alluvium, each containing evidences of human habitation and each separated from the next by a narrow band of sterile sand or clay, was noted in some parts of the site. Such a stratification did not hold for the entire site area owing to the extensive disturbance of graves and caches. Although evident at the river's edge (Lothrop 1937, Fig. 21), this stratification was not present in Trench XI, and the trench was, therefore, excavated in arbitrary levels.

In interpreting the results of the present study it should be borne in mind that the material, about 2300 sherds in all, consists of "samples" of typical occurrences of pottery as observed in the field. Thus anything but gross inferences from the statistical distribution would be questionable. In addition, all sections of the trench are not represented; no material was available from the upper sections of the east end of the trench or the lower sections of the west end. Finally, the excavation levels in the various sections are not directly comparable in many cases. For example, a 115-cm. depth may be represented in the one section by a 90- to 125-cm. cut and in another by a 110- to 135-cm. cut.

In view of these considerations, the stratigraphic results are presented for the entire trench instead of by sections and the levels assigned for statistical analysis are somewhat

* The present study was undertaken during the summer of 1955 under the direction and encouragement of Gordon R. Willey

TABLE 1. CHART OF RELATIVE CHRONOLOGY FOR THE PARITA BAY REGION, PANAMA (after Willey and Stoddard 1954, Table 13).

	Sitio Conte	Lower Santa María River	Parita Zone
A.D. 1500			
	Late Coclé		Parita-Coclé
	Early Coclé	El Hatillo	El Hatillo
1300			
	Santa María	Santa María	
	(Presumed Time Gap or Major Break in Sequence)		
			Sarigua
		Monagrillo	Monagrillo

distorted in that they do not strictly follow those by which the trench was excavated. In assigning these statistical levels, the author attempted to maintain a correspondence with certain excavation levels as far as possible. In those few cases in which the former exactly halved the latter it was found that a distortion in other levels of the same section usually offered a basis for choice. For example, where it was found that the dividing line assigned at 100 cm. encountered an excavation level of 90 to 110 cm., the material was assigned either above the 100-cm. level or below it in such a way as to cancel out distortions which were present in higher or lower levels of that particular section.

Despite these qualifications and the necessarily gross interpretations to which one is restricted, it is believed that the material has yielded results of interest. They support the impressions of Willey and Stoddard (1954) that the bulk of the Santa María Polychrome occurs in levels lower than those containing the bulk of the Coclé sherds. However, the present study indicates a considerable overlap of the 2 styles which had not been previously demonstrated and, in addition, places the greatest concentration of Coclé at lower levels than was believed to be the case. Finally, the El Hatillo ware, while overlapping Coclé styles as had been expected, is more heavily concentrated in the extreme upper levels than Coclé and thus appears to have reached its greatest popularity after that of Coclé had begun to decline. This finding indicates a slightly different sequence than that at the Girón site (Willey and Stoddard 1954) where the highest concentrations of Coclé and El Hatillo appeared in the same levels. Considering these 3 main painted wares alone (for figures on all types see Table 3), the breakdown is as shown in Table 2.

TABLE 2. STRATIGRAPHIC OCCURRENCE OF PAINTED WARES AT SITIO CONTE, PANAMA

Level	*Percentages*			*Total Sherds per Level*
	Santa María	Coclé	El Hatillo	
0-50 cm.	7	29	64	28
50-100 cm.	11	53	36	55
100-150 cm.	27	58	15	128
150-205 cm.	85	10	5	138
205-235 cm.	100	0	0	113
235-290 cm.	96	4	0	28

Among the other types noted, Red Daub ware is of minor importance showing its greatest popularity in the lower levels: 4% of all types in the fifth level, 6% in the fourth, 3% in the third, and declining steadily toward the surface. Lothrop's Red Line ware demonstrates a preference for the middle levels, for although represented at all levels it is less than 1% of total sherds in each level except the third and fourth where it makes up respectively 5% and 6% of the total sherds. The 12 sherds of Lothrop's Black on Red were scattered, though four of them appeared in the third level and five in the fifth level. Brown ware with a total of 18 sherds was most heavily concentrated in the third and fourth levels; Black ware in the first level with a scattering in the third, fourth, and fifth levels. Red Slip ware shows a high percentage in all levels, never less than 39%, but its highest concentrations occur in the lowest 2 levels where it makes up approximately 60% of the sherds in each. Plain ware appears as less than 10% of all sherds for the lowest 3 levels, then increases steadily from 18% in the third level to 30% in the second and 44% in the surface layer, an apparent increase which may in part be due to the

heavily eroded condition of most of the upper level sherds. Buff ware seems relatively evenly distributed throughout with a slight preponderance in the third and fourth levels.

On the basis of the slipped wares and their frequencies as outlined above, the third and fourth levels, from 100 to 205 cm. in depth, seem to represent a transition in the stratigraphy of the site. During the period represented by these layers Santa María Polychrome and the associated Red Daub ware drop radically in popularity, while Coclé Polychrome and El Hatillo both appear for the first time in substantial numbers. Finally, the sherd counts of 3 wares, Buff, Red Line, and Brown appear to wax and wane with this transition period; this is particularly true of the latter 2 wares which are present almost exclusively in these levels.

In addition to the painted wares mentioned above, small amounts of incised and punctated ware, similar to those outlined by Willey and Stoddard (1954), were found. Grooved Lip, the grooves usually broad and round bottomed, was the most common of these, represented as it is by 13 sherds. It occurred exclusively below 150 cm. thereby coinciding roughly with the Santa María Polychrome concentration. The Reed Punctated element (6 sherds), characterized by circular incisions, presumably made with the end of a reed, was occasionally found on the Grooved Lip sherds, but appears in heavier concentrations in the middle and upper levels. Rough Scored (9 sherds) also is concentrated in the middle and upper layers. The 4 sherds of Shell Marked were confined to the middle levels; Notched Ridged (4 sherds) occurred in both middle and upper levels. The one example of Fluted decoration found occurred in the very lowest level; the single example of Slash Punctated appeared in the upper levels.

With one exception, handles or legs of either the strap or lug variety were found in levels above 175 cm. with the highest concentration appearing above 100 cm. The exception is the occurrence of a medium sized lug, possibly a leg support, in the 235- to 265-cm. level. One

TABLE 3. SITIO CONTE, TRENCH XI. PRINCIPAL POTTERY TYPES
(by number of sherds and percentages from each level).

	Levels	Santa María		Coclé		El Hatillo		Red Slip		Red Daub		Black on Red		Totals
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
1.	0- 50	2	0.5	8	1.9	18	4.2	167	39.4	1	0.2	0	0	196
2.	50-100	6	1.8	29	8.5	20	5.9	150	44.1	7	2.1	1	0.3	213
3.	100-150	35	6.8	74	14.4	19	3.7	203	39.6	13	2.5	4	0.8	348
4.	150-205	117	25.1	14	3	7	1.5	202	43.2	27	5.8	1	0.2	368
5.	205-235	113	25.4	0	0	0	0	265	59.5	18	4.1	5	1.1	401
6.	235-290	27	18.4	1	0.7	0	0	89	60.5	0	0	1.	0.7	118
		300		126		64		1076		66		12		1644

	Levels	Red Line		Plain		Buff		Brown		Black		Unclassified		Totals
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
1.	0- 50	2	0.5	186	43.9	12	2.8	1	0.2	11	2.6	16	3.8	228
2.	50-100	3	0.9	102	29.9	7	2.1	0	0	0	0	15	4.4	127
3.	100-150	23	4.5	90	17.5	18	3.5	10	2	1	0.2	23	4.5	165
4.	150-205	27	5.8	30	6.4	15	3.2	6	1.3	4	0.9	17	3.6	99
5.	205-235	2	0.5	18	4.1	11	2.5	1	0.2	3	0.7	9	2	44
6.	235-290	1	0.7	10	6.8	10	6.8	0	0	0	0	8	5.4	29
		58		436		73		18		19		88		692

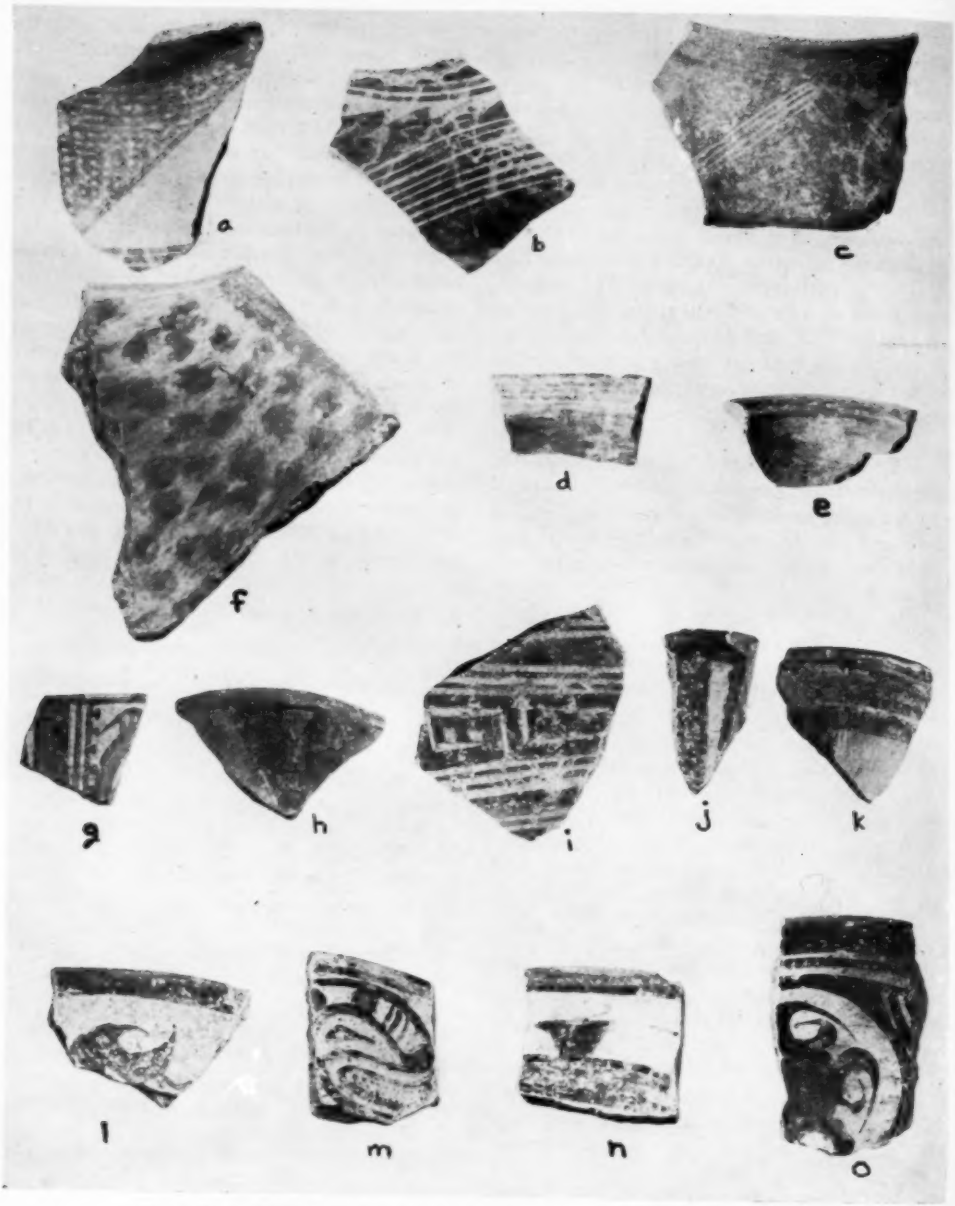


FIG. 1. Pottery from Trench XI, Sitio Conte, Panama. *a-d*, Santa María Polychrome; *f*, Red Daub; *g-k*, El Hatillo Polychrome; *l-o*, Coclé Polychrome.

strap handle very like the Alvina coastal type illustrated by Willey and McGimsey (1954) was recovered in the 85 to 120 cm. level. No loop handles, so typical of Delgado Red ware, were found. Pedestal bases, in some cases possibly sections of pot stands, appeared in all but the very lowest levels and without any period of marked concentration. Ring bases on the other hand were concentrated in the middle levels, none appearing below 200 cm., and only six out of the total of 32 ring base sherds appearing above 75 cm. The ring base, then, has a roughly similar distribution to the Red Line and Brown wares associated with the third and fourth or transition levels.

Before moving on to a description of the pottery types it should be noted that the stratigraphy of the trench was undoubtedly affected by the 4 graves and 3 caches discovered in it. Although this activity would not affect the main outlines of the sequence noted, it might very well be the main determinant in those cases where the numbers of sherds are very small, and may account in part for the overlap noted between the major decorated wares. On the other hand it is unlikely that a distribution of as large a number of sherds as were found in the third level (Santa María 35; Coclé 74; El Hatillo 19) can be explained mainly in terms of mechanical disturbance, and the implication of continuity of styles therefore remains.

Pottery Types. The main pottery type classifications followed in the study were those already defined by Willey and Stoddard for the El Hatillo and Santa María types, and by Lothrop for the Coclé types as set forth in the reference publications. Minor types were either recognizable on the basis of these works, such as the Red Daub (Willey and Stoddard) or were separated out of an earlier classification as was done with the Brown ware and the Black ware, both of which are listed by Lothrop as "Smoked Ware." This latter breakdown was undertaken largely in a provisional and experimental fashion in order to see if a significant pattern emerged. A brief recapitulation of the types encountered in the study is set forth below.

Santa María Wares (Willey and Stoddard 1954). The temper is of crushed quartz or purple rock, and occasional lumps of hard brown material which may be hematite also appear. Thickness varies greatly depending on the size and section of the vessel. The ground color is buff of various shades from light to dark and has been achieved in some cases by the use of a light wash or slip. Red pigment applied over the buff may also vary from orange to deep red. Finally, dull black pigment is added. These 3 colors are arranged in various combinations, four of which have been outlined by Willey and Stoddard as follows:

> One of these is a cross-hatched decorative motif which is invariably allied with a large globular, or subglobular, jar with an outflared collar. The basal half of these vessels is solid red, and the collar or neck is painted in the same shade. The upper half of the body, which has been left buff, is crossed by hourglass shaped figures which have been filled with broad-line black cross hachure. A second subtype incorporates both collared jars and smaller bowls with incurved rims. Color is used in the same way with the main design elements being carried out in black-on-buff. These elements are bands of parallel horizontal or vertical lines, pendant triangles, and lozenge-shaped figures. A third subtype utilizes a complete exterior red slip over which the black designs are placed. Decorative elements and vessel forms are much the same as in the second subtype. Still another decorative variant is a wide solid black band encircling a bowl with an incurved rim. The base of the bowl is red, and a continuous zigzag or chevron design of parallel lines runs through the black encircling band.

In addition to the forms mentioned above, Willey and Stoddard also describe an open bowl of medium depth with thickened rim and wide flat lip. Most of the sherds found in Trench XI were too fragmentary to indicate form; however a number of rim types were noted which appeared associated with the various pottery types. The most common Santa María rim in Trench XI was that of the broad lip with a flat upper surface, the lip usually extending horizontally beyond the vessel's exterior, but quite commonly slanted outwards and upwards. A variation of this horizontal type was noted with an interior overhang in addition to that of the exterior. A different type also associated with the open bowl consisted of an unmodified rim except for a slight thickening at the lip. Finally large jars with high collar rims, some vertical but more commonly with a slight flare were common. Since the high collar rim is normally if not always of red slip with no polychrome decoration above the shoulder of the vessel, most of these were recorded as Red Slip type. In the fourth level a few plate sherds with a flattened and thickened lip were found.

Red Daub. A variation of Santa María ware, Red Daub may appear on a vessel decorated in other areas with Santa María Polychrome. In these cases the Red Daub usually appears in the interior. As defined by Willey and Stoddard, the decoration consists of irregular daubs, smears, and occasionally a tear drop decoration of light red pigment. In so far as these red markings are regular and clearly defined, as the tear drop elements occasionally are, the sherd may be similar to Lothrop's Red Line ware. The shapes are those of Santa María Polychrome, and Red Daub has been found on large jars or ollas with high flared collars, bowls and ollas with short everted rims, and shallow bowls and plates. Trench XI revealed no plates of Red Daub however, and the rim type most commonly associated with it was the flat horizontal lip with exterior overhang. In addi-

tion, fragments of shallow bowls with a thickened and flattened lip were found.

El Hatillo. The El Hatillo complex defined by Willey and Stoddard includes El Hatillo Polychrome and Delgado Red. The ware is slightly harder surfaced, slightly thinner, and a bit sandier than the Santa María types. Paste ranges from light to dark brown while the ground color is a tan or brownish slip. Occasionally a tan-orange or rose-orange shade may be encountered. Black, both dull and glossy, and occasionally purple are added to make the polychrome. Designs are often complex, utilizing highly stylized animal or demon concepts. Broad scroll elements are common as are rectangular or trapezoid panels filled with serried diamond elements of red or purple.

Typical forms cited are plates with thickened margins, shallow open bowls, ollas or jars with short collars and horizontally everted rims, subglobular ollas with constricted orifices, and effigy jars and bowls. Those examples found in Trench XI demonstrated a moderately flared rim with a slightly thickened lip. No horizontal everted rims were noted, and no bases were found.

In the present study no attempt was made to distinguish between Delgado Red and other red-slipped types, primarily because the sherds in most cases were too fragmentary to allow determination of form, the main criterion for distinguishing Delgado Red from Santa María Red. A number of pedestal bases in Red Slip were found which would suggest the presence of Delgado were it not for the wide distribution of these well down into the middle levels. Five red-slipped, unmodified, constricted orifice rim sherds were found, another diagnostic of Delgado Red, three in the upper levels and thus associated with El Hatillo, and two in the deep levels. No loop handles of the Delgado type were found.

Coclé. No attempt will be made here to summarize Lothrop's exhaustive study of Coclé ceramics; suffice it to say that those sherds with white or near white ground slip having red, black, or purple designs typical of Coclé Polychrome or a combination of the three were classified as Coclé. Of the 126 sherds so classified, 103 were found between 50 and 150 cm,; only one Coclé sherd was found below 205 cm. Among the forms commonly found were plates with the "drooping lip" rim, an Early Coclé type, and others with the unmodified or slightly modified rim type. Small bowls normally had a slightly flattened lip, but invariably were without the pronounced extension beyond the body of the vessel so characteristic of Santa María wares. The rim base was more common than the pedestal.

Red Slip. In this particular study Red Slip was used as more or less of a "catchall" category in which were placed all sherds with plain red slip. No attempt was made to distinguish between Santa María Red Slip, Delgado Red, or the red wares noted by Lothrop as occurring in association with Coclé wares. On this basis Red Slip is the most popular ware at all levels except the surface and appears in a variety of forms and rim types. Included in these are typical Santa María rims in the lower levels and the "drooping lip" of the Early Coclé period in the upper middle levels. A few sherds of a unique rim type occurring only with Red Slip plates and primarily in the middle levels were noted. These were characterized by a thickened lip section as if the edge of the lip had been rolled in on the upper surface of the vessel toward the center. Both pedestal and rim bases were common.

Black on Red. The 13 sherds of this type found in Trench XI were all portions of plates with red ground slip and black bands encircling the vessel interior near the rim. In one case buff was present as ground color in addition to red, suggesting that the type may be related to Santa María Polychrome. In this connection it may be significant that though the vertical incidence of the sherds was fairly even, they do appear in the lowest levels in a slightly higher concentration than elsewhere. Both early and late rim types were associated with the ware.

Red Line. The sherds so classified in the present study invariably had a white or off-white ground color, often highly polished and a regular well-defined red decoration, usually a band, or portion of a circle. They were distinguished from Red Daub on the basis of the white slip and the regularity of red design. Most sherds were rim fragments with red slip running around the lip of the rim, the remainder of the neck being white. No plates were noted and rim types were predominantly of the short everted or flare type associated with a subglobular bowl. As noted earlier, the distribution of the ware is heavily concentrated in the middle levels.

Smoked Ware. This was broken down into Brown ware and Black ware partly as an experiment and partly because of an apparent difference in ware qualities, the Brown ware tending to be more highly finished with a finer temper.

Brown Ware. This ware is normally chocolate brown with fine temper, often having a polished finish and characterized in Trench XI by small vessels, bowls, or cups. Rims and lips were most often of the type illustrated by Lothrop as Early Coclé, that is a square lip on a straight collar or bowl side. Both ring and pedestal bases were found. The distribution, as noted, was concentrated in the middle layers, continuing with less frequency into the upper layers.

Black Ware. The finish is a dull black occasionally verging on deep brown. Temper is normally coarser and the ware gives an appearance of cruder workmanship than the Brown ware. A unique rim type restricted to Black ware was noted on 3 sherds on which the lip was thickened on the outside in alternate areas so as to give a wavy appearance and had a single groove in the upper surface running around the lip. A few unmodified rims were also found, but rim sherds were rare. Although heavily concentrated in the 0 to 50 cm. level, occasional sherds were found down to 235 cm.

Conclusions. (1) Santa María Polychrome and its associated Red Slip and Red Daub types were clearly popular at Sitio Conte during the

earlier stages of habitation, and were only gradually replaced by Coclé Polychrome and associated types. This gradual process is indicated by the overlap of significant percentages of the 2 main complexes in the third and fourth levels of the stratigraphic trench. (2) Following the popularity of Coclé wares in the second and third levels, the El Hatillo complex became the common type. Although related to Coclé type in design and rim type, and developing along with it, the El Hatillo style reached its greatest popularity at Sitio Conte after the Coclé types had begun to decline numerically. (3) There appears to have been a period of transition represented in the third and fourth layers when Santa María types were dropping out and Coclé types coming in. In this same period 3 minor wares, Buff, Brown, and Red Line had their greatest popularity only to die out later. This period is also marked by the occurrence of plate lip types in both Santa María and Coclé wares which later disappear.

HOLMES, W. H.

1888 Ancient Art of the Province of Chiriqui, Colombia. *6th Annual Report of the Bureau of American Ethnology, 1884-85*, pp. 3-187. Washington.

LINNÉ, SIGVALD

1929 Darien in the Past: The Archaeology of Eastern Panama and Northwestern Colombia: *Göteborgs Kunglein Ventenskaps-och vitterhets-samhälles handlingar*, Femte Följden, Ser. A, Band 1, No. 3. Gothenburg.

LOTHROP, S. K.

1937 Coclé, An Archaeological Study of Central Panama. *Memoirs of the Peabody Museum, Harvard University*, Vol. 7, Pt. 1. Cambridge.

1942 Coclé, Pottery of the Sitio Conte and Other Archaeological Sites. *Memoirs of the Peabody Museum, Harvard University*, Vol. 8, Pt. 2. Cambridge.

1950 Archaeology of Southern Veraguas, Panama. *Memoirs of the Peabody Museum, Harvard University*, Vol. 9, No. 3. Cambridge.

MACCURDY, G. C.

1911 A Study of Chiriquian Antiquities. *Memoirs of the Connecticut Academy of Arts and Sciences*, Vol. 3. New Haven.

MARSHALL, DONALD

1949 Archaeology of Fan Beach, Panama Canal Zone. *American Antiquity*, Vol. 15, No. 2, pp. 124-32. Menasha.

OSGOOD, CORNELIUS

1935 The Archaeological Problem of Chiriqui. *American Anthropologist*, Vol. 37, No. 2, pp. 234-43. Menasha.

STIRLING, M. W.

1949 Exploring the Past in Panama. *National Geographic Magazine*, Vol. 95, No. 3, pp. 373-99. Washington.

1950 Exploring Ancient Panama by Helicopter. *National Geographic Magazine*, Vol. 97, No. 2, pp. 227-46. Washington.

WILLEY, G. R.

1951 A Preliminary Report on the Monagrillo Culture of Panama. In "The Civilizations of Ancient America," pp. 173-80, edited by Sol Tax. *Selected Papers of the XXIXth International Congress of Americanists* [New York, 1949]. Chicago.

WILLEY, G. R. AND C. R. MCGIMSEY

1952 Archaeology in Western Panama. *Archaeology*, Vol. 5, No. 3, pp. 173-81. Cambridge.

1954 The Monagrillo Culture of Panama. *Papers of the Peabody Museum, Harvard University*, Vol. 49, No. 2. Cambridge.

WILLEY, G. R. AND T. L. STODDARD

1954 Cultural Stratigraphy in Panama: A Preliminary Report on the Giron Site. *American Antiquity*, Vol. 19, No. 4, pp. 332-43. Salt Lake City.

HARVARD UNIVERSITY
Cambridge, Mass.
November, 1955

PREHISTORIC VILLAGE DISTRIBUTION IN THE ILLINOIS RIVER VALLEY

JOHN C. MC.GREGOR

IN THE summer of 1954 the University of Illinois undertook an extensive archaeological village site survey of the Illinois River valley. The Illinois River, more than 250 miles long, is located in the heart of the great Central Plains, an essentially uneroded region of drift covered uplands, with a billowy surface and less than 1000 feet altitude above sea level. The river is the largest, except for the Ohio, draining into the Mississippi from the east. It gathers rainfall from about 25,000 square miles, almost half the total area of the state of Illinois, and flows into the Mississippi about midway between its head and mouth. It is located centrally on a venation of waterways stretching from the foothills of the Rockies to the Appalachians, and from the Great Lakes to the Gulf.

In the geological past outflow went from Lake Michigan down the Illinois River, so that the stream now meanders through a broad floodplain bounded by bluffs. In the upper portion, which flows almost west, the valley varies between about 1 and 1½ miles in width, but in the rest of its course, that which flows almost south, it varies between 2 and 5 miles wide.

In the plains of Illinois the woodlands were largely narrow bands bordering the valleys of the streams. In the past, as at the present, the Illinois River has provided man with a ready means of extensive travel, not only from the Great Lakes to the Mississippi but to far places as well, and an abundance of foods, such as fish, game, and agricultural potentials, and shelter, wood, and natural spring waters. In a prairie of high grasses, which was seasonally a quagmire, it was therefore the main rivers, like the Illinois, and the streams draining into it like the Spoon and Sangamon, which first attracted and then held man.

Although the survey was made during the months when crops were unusually high, and rank, something over 300 villages were located. Surface collections were made from every site where material could be found at the time of the visit, and a number of sites were stratigraphically tested by pits. Cultural material was secured from over 100 sites, and made possible the determination of their general culture stage, and relative time period.

Ten broad culture stages were subsequently chosen for analysis, and plotted on a large scale map of the valley to show distributions. Only those sites from which collections are now at the University were considered. No effort was made to include sites previously reported in the literature, or otherwise known, since specific environmental conditions were not known at first hand for these sites.

The purpose of this study was to attempt to shed some light on the following problems: (1) the areal distribution of the various culture units considered; (2) the specific location of each village, of each culture, to determine detailed environments; (3) generalization of environmental preference through time and by culture; (4) the determination of cultural frontiers, or other political-cultural features; (5) the indication of directions for future analysis of this material, future excavation, and other research in the field; and (6) the permanent archival preservation of site locations and cultural content. Some progress has been made with each of these problems.

Archaic. One result of the survey was more information on the location of Archaic sites in this area. As may be seen in Figure 2 A, the projectile points by which this particular Archaic culture may be identified are distinctive; characteristically long, and rather thick, but expertly flaked. There are also slate pendants, and short bitted, broad, ¾-grooved axes, not illustrated. These people did not have pottery; they ate quantities of river clams, and built low shellmounds of the castoff shells, and also ate turtles and the usual deer and other land mammals. They were therefore gatherers and hunters of most readily available native foods. Although they lived in campsites of restricted area along the river no specific house structures have been found, so it may be assumed they had relatively impermanent houses. No radiocarbon dates have yet been secured, and while they obviously do not represent the earliest Archaic known from the Midwest they are believed to be about 3000 years old, or perhaps slightly older.

The map, Figure 1, shows the distribution of the few sites of this culture known specifically

to the writer. There are only five, and they vary in location. In the north one site is on top of Starved Rock. In the Peoria area the sites are on the side slope of the bluff, and on a major side stream. The 2 sites in the lower valley are in the valley bottom, only slightly above the present average level of the river, and more or less covered by silts. These latter are especially difficult to locate, but it is felt that having found these, and knowing their preferred location we can find more by systematic search.

The silt-filled valley bottom, where these lower valley sites are located, is today so undesirable for occupation that it certainly would not now be chosen even for brief camps. The area is naturally swampy, frequently overflowed by the river, filled with a clayey silt, and contains mosquitoes. The environment in Archaic times must therefore have been different. Probably this portion of the valley was more cleanly scoured and lacked the present relatively deep silt fill, so that the slight sandy ridges on which sites occur would have been good camping spots.

Black Sand. This culture has been considered as identifiable on the basis of the sandy cord-marked sherds with boldly incised designs of the type illustrated in Figure 2 *B*. Nine sites of Black Sand culture were found, and as the ceramic contents of these sites were studied, and compared to those of Morton culture, the pottery of these 2 groups more and more seemed to be similar, so that it became increasingly difficult to separate them. Too few other artifacts were found to assist in making this distinction.

No dates have been secured from sites of either Black Sand or Morton culture, but they clearly date sometime between Archaic, which has been estimated as some 3000 years old,

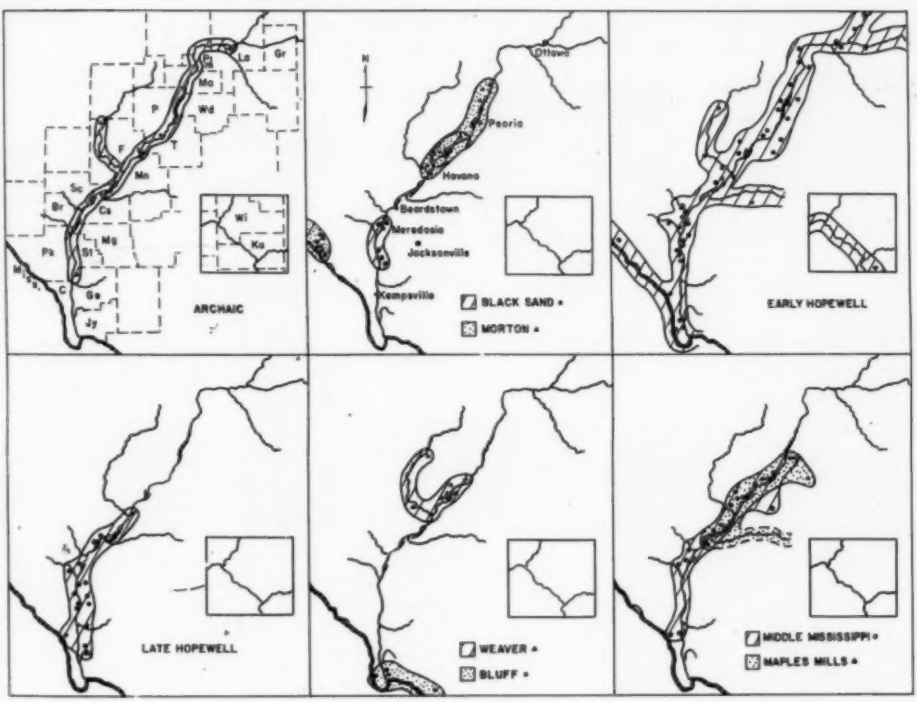


FIG. 1. Maps showing distribution within the Illinois River drainage of the 10 cultures represented. County symbols are as follows: Br, Brown; C, Calhoun; Cs, Cass; F, Fulton; Ge, Greene; Gr, Grundy; Jy, Jersey; Ka, Kankakee; La, La Salle; Ma, Marshall; Mg, Morgan; Mn, Mason; P, Peoria; Pk, Pike; Pm, Putnam; Sc, Schuyler; St, Scott; T, Tazewell; Wi, Will; Wd, Woodford.

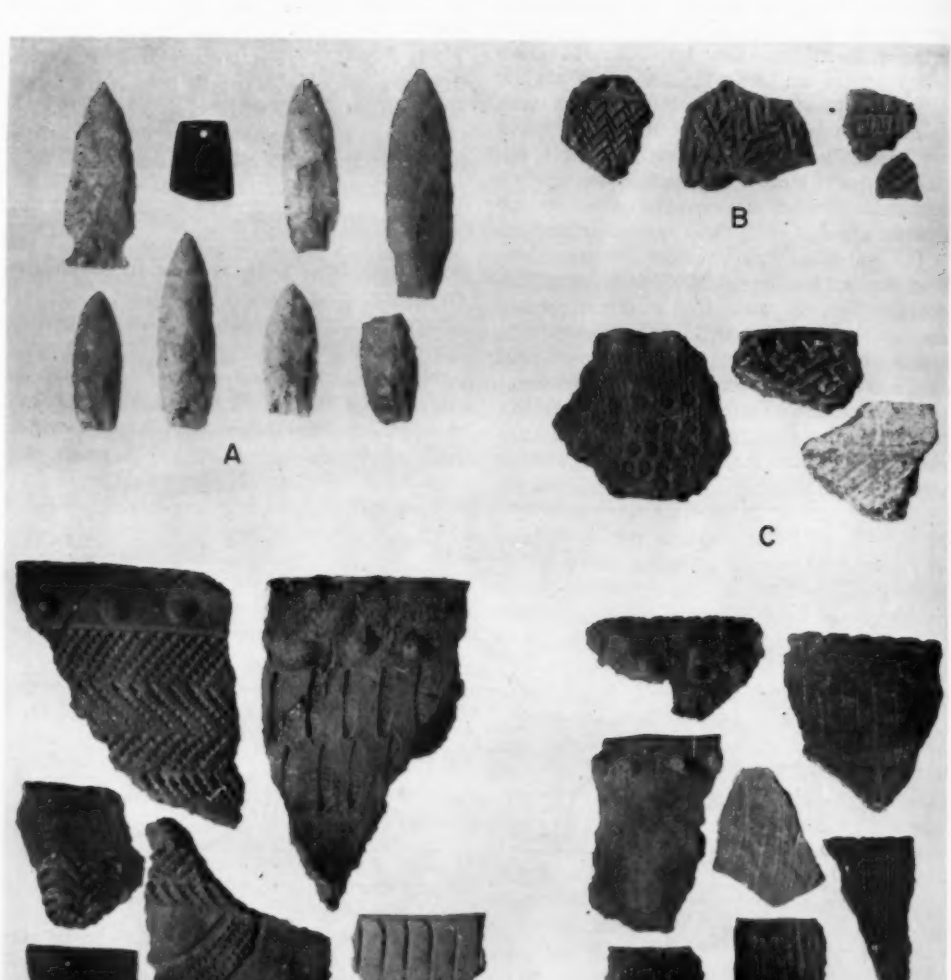


FIG. 2. Stone artifacts and pottery types diagnostic of 5 Illinois culture stages. A, Archaic; B, Black Sand; C, Morton; D, Early Hopewell; E, Late Hopewell.

and early Hopewell from which one date of 2500 years has been secured. No evidence of house structures was found, and the sites seem to have been more camps than permanent occupations.

The Black Sand sites cluster in 3 distinct areas. None is north of Peoria or south of Pike County. The fact that the third area of concentration is on the Mississippi river, straight west of that in Brown, Morgan, and Scott counties, strongly suggests that specific environmental conditions were required or sought by these people at this time.

Seven of the 9 sites, and all of them in the lower valley, are in the river bottoms, only a few feet above the present river level. One site is located on the bluff slope about 20 feet above the river, and near Peoria one site is on the bluff. As has already been pointed out the locations in the river bottom are in an environment almost impossible to exist in today, because of the poor natural drainage, insects, heat, and humidity. Conditions were thus very likely different from today, but in just what respects still remains to be demonstrated. The vertical distribution of these sites by regions is the same as that of the Archaic so that somewhat similar environmental conditions probably prevailed at both of these times.

Morton. The Morton culture has been identified by coarse tempered cord-marked, or smoothed, pottery, with vigorous designs which are punched, slashed, or of trailed lines, as illustrated in Figure 2 C. Although similar in general culture, in so far as is now known, and probably close in time, Black Sand and Morton are usually distinguishable by pottery types. There is strong suggestion that Morton pottery types developed into early Hopewell types, at least in the upper and middle Illinois Valley, and some indication that Morton may be slightly later than Black Sand.

The 9 sites identified as Morton extend the Black Sand distribution northward from Havana to Marshall County, and a cluster of sites identified as Morton are found in the same area as the Black Sand sites in the Mississippi valley (Fig. 1). Five of the sites are in the bottoms, three on the bluff slopes some 50 to 60 feet up, and one on the bluff top at Lake Peoria. They are therefore more varied than the Black Sand, and it would seem that by

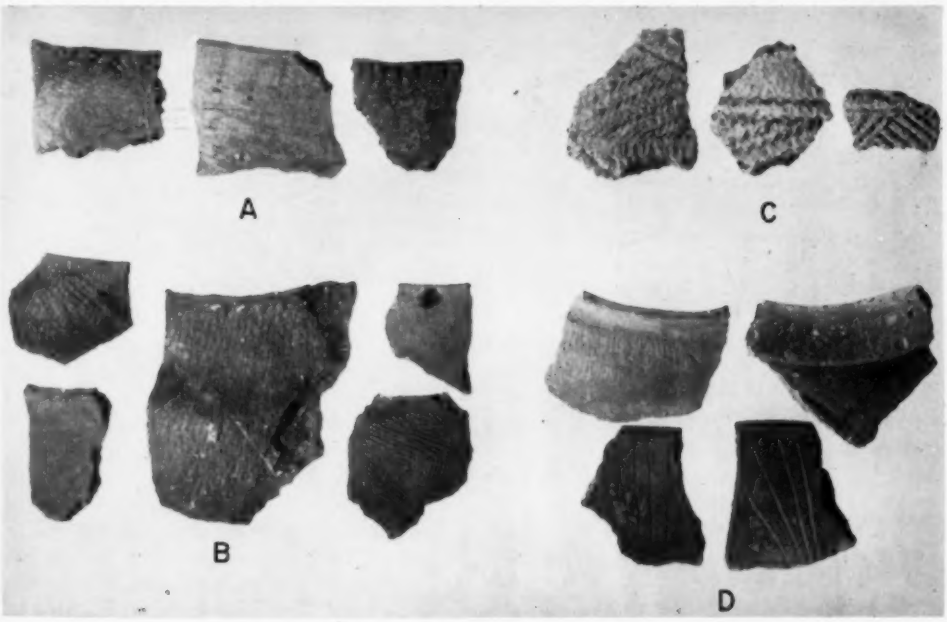


FIG. 3. Pottery types diagnostic of 4 Illinois culture stages. A, Weaver; B, Bluff; C, Maples Mills; D, Middle Mississippi.

Morton times people were moving somewhat out of the bottom area.

Early Hopewell. Early Hopewell has been defined by the types of pottery illustrated in Figure 2 *D*. In general, it is stamped in formal patterns in zoned areas, has nodes, and, most typically, beveled rims. A few types, like Hopewell Zoned, are polished. Radiocarbon dates of these pottery types are in the vicinity of the time of Christ, or about 500 B.C. to about A.D. 200. This is the classic Hopewell culture of the Illinois River valley, and much is known concerning it. Villages, though not large, are more permanent, oval and circular dwellings of the general "wigwam" type are known, agriculture was practiced, exceptional ornamental objects were produced, and trade was very widespread.

There are a total of 45 definite early Hopewell sites, a fairly adequate sample to work with, and one which may be materially extended in the future. These sites are very widespread, not only through the Illinois valley but up and down the Mississippi, and through the major side streams, such as the Spoon and Sangamon (Fig. 1). 42% of these villages are located on side streams, just within the edge of the bluffs, and just above the level of the floodplains; 27% are at, or near, the river level, but ⅓ of these are associated with mounds, and may have been somewhat temporary camps located there while the mounds were being built. Since this culture is so widespread some 20% are located in river valleys far from the Illinois. The rest are in varied locations.

Specific local conditions seem to have been important to these people, and the environment does not seem to have been much different from that of today. They wanted the shelter of hills about them, preferring not to live out in the bottom of the main valley. This suggests the possibility that they might have feared attack by unfriendly people. The side streams they chose had to be large enough to float a canoe. They seem to have insisted on fresh spring water. They wanted flat, arable lands nearby, where they could practice agriculture. Their broad distribution does not indicate any real frontiers in the area under consideration. The specific location of their villages indicates a further spreading away from the river bottoms proper.

Late Hopewell. The later Hopewell sites, seventeen in all, are considered to be those which are not clearly Weaver or Bluff, and in which the pottery is thinner and plainer than early Hopewell (Fig. 2 *E*). Very few types are stamped, but scraping or scratching, and cord marking is common, and rims are rounded instead of beveled. No dates are available, but presumably these sites existed sometime after A.D. 200. Villages are not large, but seem to have been more or less permanent. The known houses are small rectangular brush and pole structures. Ornamental artifacts are not so varied or as skilfully made as those of early Hopewell, and trade contacts seem to be more limited.

59% of the sites are located on the slopes of the bluffs, where a side stream comes into the valley, or near a lake. 24% are at river level, and others are on side streams, on the bluff tops, or in other locations.

This is a fairly usable sample, which though variable, is in the same general tradition as the earlier Hopewell sites; mostly on side streams, and often with springs. The rest are scattered. Few sites are on the bottoms near the river, but if so they are generally where the bluffs almost touch the river channel. This culture is also widespread, and found in side valleys away from the main river, but is limited to the central and lower Illinois valley. The northernmost site is at the mouth of the Spoon river, and the southernmost is north of Jersey County.

Weaver. Only 6 sites of Weaver culture have been included in this material, and they are indicated by the pottery types shown in Figure 3 *A*. This pottery is moderately thin, smoothed or cord marked, and typically decorated with notched or stick-marked rims. In time Weaver probably somewhat overlaps late Hopewell, but survives it. Known houses are rectangular, villages are of moderate size, and more or less permanent. Material culture is not outstanding, and seems to be somewhat a continuum from late Hopewell.

There are too few sites in this sample to reach valid generalizations, except that all are north of the late Hopewell sites, so that here for the first time is a clearly indicated frontier. They are also variable in location, from the top of the bluffs to the bottom of the main river, and the bottom of the Spoon River.

Bluff. Sites of Bluff culture contain pottery of the types illustrated in Figure 3 *B*. It is thin and grit tempered with fine spaced cord marking, occasional rim lugs, and round bottomed or cocoanut shaped forms. In time these sites are probably about comparable to Weaver. No houses are known to the writer, but villages are of moderate size, and appear more or less permanent. Elbow pipes are often elaborately carved, but other traits are not outstanding.

The Bluff sites are clearly southern, extending up the Mississippi to just about the middle of Jersey County, so that once more there is definite evidence of a frontier, this time south of middle Hopewell. None of the 4 sites listed is located on the main channel of the river. Two are in the valleys of side streams, and two are on top of the bluffs. Their removed locations raise the question of whether or not the inhabitants were getting away from the main stream because they feared enemies, because life in the bottoms was unhealthy, or for other unknown reasons.

Maples Mills. This culture is represented by only 2 sites, and has been defined by the presence of pottery types such as those shown in Figure 3 C. Designs on the necks are formed by the impression of cords in geometric patterns. Sites of this culture are late, but as yet have not been dated. Little is known about the nature of this culture.

Both Maples Mills sites are in Tazewell County, one 40 to 50 feet above the river on a side creek, the other in the bottom of the Mackinaw River far from the Illinois. Other sites are known, which are not high above the stream, but somewhat up from the bottoms. It is obviously impossible to generalize from the present inadequate sample.

Middle Mississippi. No effort has been made to separate Middle Mississippi sites into possible divisions, but they have been identified by the well-known shell-tempered pottery types illustrated in Figure 3 *D*. The most common utility types are cord-marked jars, but others are polished and incised, or even painted. Rims are often outrolled, and forms are round bottomed, with plates and bottles not uncommon. Many of these sites are quite late, some probably extending into the 15th or 16th centuries. Houses are rectangular with thatched roofs, and villages are large and permanent, and often include flat topped "temple" mounds. Many artifacts are elaborate and varied.

The map shows the general area occupied by the 19 sites as extending from northern Calhoun County to Peoria. It may be significant that the northernmost site is at the southern end of Lake Peoria. In 67% of cases these sites are either on the tops of the bluffs, or on the side of the bluffs on what might locally appear to be the top, or high up on the foothill slopes of the bluffs. They are also often on side streams. 33% of the sites are on the river bottoms, and then, except in 2 cases, they are either on a side stream, a lake, or on a prominent sand ridge. There is thus a tendency for them to be located high above the river, or on side streams far from the river.

These people do not seem to have been seeking sheltered spots so much as height. Neither do they seem to have been particularly concerned about other people, even in the north and south, where there are apparently definite frontiers. In Fulton County the 6 sites from which we have material are all either on the bluff tops or near them, none in the bottoms. There would thus seem to have been a continued movement away from the bottoms at this time.

This culture does not represent a continuum from the preceding cultures of the Illinois River, but rather an intrusion of southern peoples into this area. Their choice of village site locations must therefore have been the result of some specific local environmental condition, or cultural demands, not now apparent. It may well be that the main river bottoms were becoming so poorly drained as to be uninhabitable, although near St. Louis the great Cahokia area, in the Mississippi bottoms, was extensively occupied by people of this culture.

Historic. The criteria of defining historic sites need not be reviewed except that it refers herein to the post-European contact period. Material was collected by the survey or was already in the University of Illinois collections from 7 sites. These are substantial, but seasonally or periodically occupied, villages. All, without exception, are located on the banks of the Illinois River proper. Although it is known that historic villages were scattered throughout the valley there is a concentration in the northern part.

Summary. From such a survey as this certain generalizations are possible, and certain directions for future work are indicated. The material now in hand, when adequately studied and evaluated, will yield much more information than can be seen at the moment, and with the addition of more sites, and more artifacts, more can be accomplished. Ceramics need careful analysis, and the correlation of other types of artifacts, such as projectile points, will be most informative. Black Sand might be separated from Morton by the presence of a specific point type. Hopewell and Middle Mississippi can almost certainly be further subdivided with profit.

At the moment probably the most important contribution is the suggestion of varied environments through time. Archaic sites in the bottoms clearly indicate different conditions than at present. Black Sand sites are also largely (90%) on the bottoms, whether on the Illinois or Mississippi, and on easily drained sand ridges as well. Morton sites tend to be on, or near, the bottoms, except in the north where they are higher. The Black Sand people, Morton, and even Archaic, occupied about the same latitudes, whether on the Illinois or Mississippi.

Probably Postglacial climate and erosional conditions were at least in part dictating their locations. There would seem to be evidence that early in the occupation of this area the river valley was better drained than it was later when it became widely alluviated. At this time campsites were in the valley bottom proper, at least in the lower valley, and on slight sand ridges where there was drainage, but with ready access to the river. Subsequently the accumulation of silts covered several of these early sites, and villages were located higher up or farther back. A detailed study of clam shells found in these sites, now being undertaken at the University of Illinois, shows the earliest specimens were largely dwarfed in comparison to modern examples of the same species. This suggests that environments differed, and that as a result the rivers carried less of the foods demanded by these animals than they have now.

By early Hopewell times there was a dispersion away from the bottoms to side valleys, though there were a few sites still on the bottoms. Many were far from the Illinois River. This must have been a vigorous group, which crossed what appear to have been earlier frontiers. Perhaps the bottom lands had become less healthy as a result of silt filling and poorer drainage, or they may have been fearful of unfriendly people, or both.

Late Hopewell sites are bounded by Bluff on the south and Weaver on the north, and the preferred location is like that of early Hopewell, so there was probably little environmental change at this time. The inadequate sample of Weaver and Bluff sites makes location generalization difficult, but the tendency seems to be away from the main stream, particularly to the south.

Middle Mississippi are clearly higher than the earlier sites, probably because of continued environmental changes, including poorer drainage in the bottoms. This may in part have been a result of lush vegetation. Their exposed locations on the bluff tops do not seem to indicate fear of other people. The southern frontier is still unchanged, and seems to be the northern frontier of Bluff.

The sample of Maples Mills sites is far too small to permit generalization, but there is some suggestion that they are middle valley, and more on side streams than the main river. The historic sites are all directly on the bank of the Illinois. It is hard to conceive that environment had again changed drastically enough to permit occupation in a previously uninviting location. Possibly it was a different pattern of life that enabled them to settle in the bottoms successfully.

In the lower valley the choice of village location through time seems to have been first the main stream and floodplain, then the foothills and side streams in the foothills of the bluffs, then the sides of the bluffs, and finally the tops of the bluffs. Just north of Peoria this sequence is found to be reversed. The earliest, and highest, occupation here is Morton, then there is early Hopewell, and finally Middle Mississippi at the lowest level. The reason why this order prevails here is still to be demonstrated.

This continuing attack on the archaeology of the Illinois River valley has resulted in some more, and different, ideas not only about the customs and culture of these people, but about the environment they lived in as well. Though far from conclusive at the present stage this method has achieved some success, and re-

sulted in what is believed to be a better understanding of the culture growth of the area over a long period of time, rather than the sequence of changes of cultural fragments, or such particular cultural details as pottery alone. A number of specific problems have been formulated for future study, and broader meaning has been given to such detailed understandings as site excavations. This type of study could be pursued in other archaeological areas, where it would be equally rewarding.

University of Illinois
Urbana, Ill.
November, 1955

SAMUEL K. LOTHROP

The A. V. Kidder Medalist in Archaeology for 1956

CITATION

(Read at the annual meeting of the American Anthropological Association, December, 1956, Santa Monica, California)

To Samuel K. Lothrop, outstanding archaeologist and distinguished Americanist, for the sound quality of his scholarship, for his persevering industry, and for his great love of his subject. This award is a measure of the admiration and respect of his colleagues. Long a devoted worker in the field, museum, and library in Latin American prehistory, Lothrop's accomplishments in Mayan and Central American archaeology are of unusual brilliance. The manner in which he has presented and published his materials sets high standards for those who follow him. The American Anthropological Association and the anthropological profession at large give sincere acknowledgement to an outstanding career.

Editor's Note: The Alfred Vincent Kidder Award for achievement in American archaeology was established in 1950, at the time of A. V. Kidder's retirement as Chairman of the Division of Historical Research, Carnegie Institution of Washington, and is given every third year to a person chosen by a committee of the American Anthropological Association.

The first award was made to Alfred M. Tozzer, and in 1953 the award went to Earl H. Morris.

Additional information on the award may be found in American Antiquity, Vol. 16, No. 3, p. 267 (Jan., 1951).

FACTS AND COMMENTS

A DISTINCTIVE ARTIFACT COMMON TO HAITI AND CENTRAL AMERICA

Evidence of aboriginal contact between Mesoamerica and the Greater Antilles is hardly overwhelming and the little that has been gathered remains controversial. The problems surrounding the derivation of the Antillean ball game (for a brief summary, see Rouse 1953: 197) exemplify the need of caution in interpreting resemblances. A more generalized connection between the areas exists on the level of the sociopolitical organization developed in Classic Lowland Maya culture as well as in the Circumcaribbean and the Gulf Coast area of North America (Steward 1947: 104-5; Sears 1954). One can only ponder whether or not the stimulation of actual contact is necessary to account for such similarities. Berlin (1940) has studied the chances and evidence of interaction between the mainland and Cuba via the relatively narrow but often dangerous Straits of Yucatán. He concludes that, if contact did take place, it was quite infrequent and of little cultural significance. Another similar study, by Morales Patiño (1947), ends approximately on this same note. These conclusions would probably agree with Bernal Diaz's observation of Jamaicans fortuitously present on Cozumel (Diaz del Castillo 1928: 61-2). Maurice Ries's discovery of a few Maya sherds and obsidian implements on the western tip of Cuba offers additional, but by no means certain, signs of pre-Columbian contact. The gold figurine found in Cuba (Miguel Alonso 1950) is also suggestive. And Nicaragua has yielded a few objects, notably a distinctive metate and a few pumice sculptures, that have striking counterparts in collections from Haiti and Puerto Rico (Richardson 1942, Figs. 1, 2).

The purpose of this note is to record the presence both in Middle America and the Greater Antilles of a flint implement the form and technique of which seem relevant to this problem of areal relationships. In form (Fig. 1) the implement is a tanged, elongated triangular blade, triangular to trapezoidal in section, and of variable length. The apparent manufácturing technique is as follows: a large, pointed core-struck flake is rechipped on its bulbar end to produce a tapered stem; the slightly concave underside of the flake (reflecting the core itself) is only rarely retouched along its edges and point. These edges, however, are frequently nicked from use. Essentially, the artifact is a stemmed, core-struck prismatic flint blade, unretouched save for the diagnostic tang itself. While the examples to be noted below are exclusively of flint, both the form and technique do occur in obsidian, notably at Teotihuacán and Copan (Linné 1934, Figs. 298-9; Longyear 1952, Fig. 92 *b*, *e*).

In the Antilles, these flint implements are seemingly restricted to Haiti where Rouse and others have encountered them in Couri and later deposits (Rouse 1941, Pls. 1, *1*; 2, *1*, *2*, 4). About a dozen other examples, also from Haiti, are illustrated by Mangones and Maximilien (1941, Pls. 5, 6). "Flint daggers" and "pointes de lance" are the terms used to describe the Haitian specimens. Lovén (1924, Pl. 7, 3) shows a fine specimen as coming from Jamaica; Hatt (1932: 8) believes it to be Mayan, erroneously cataloged as Jamaican.

On the mainland, British Honduras has been particularly productive of these artifacts. The collections of the Museum of the American Indian, Heye Foundation, contain at least 8 examples from the Belize District and Orange Walk, while the American Museum of Natural History possesses 2 fine small specimens from "north of Belize." Five are illustrated and discussed by Joyce (1932, Pl. 6). Stevens (1870: 290, Fig. 10) shows another typical example. One broken piece was a surface find at Pomona (Kidder and Ekholm 1951, Fig. 5 *a*). Another was excavated at Noh Mul by the Ganns (1939, Pl. 1, *2*). A fragmentary example was found at Lubaantun (Joyce 1926, Pl. 24, Fig. 2). A Late Classic San José cache contained 7 cruder than usual flint blades of this type (Thompson 1939, Pl. 27 *d*). A. Hamilton Anderson, Colonial Archaeological Commissioner, has kindly informed me of 3 other such objects, recently discovered at Louisville, as well as a single specimen from near the airfield west of Belize. And, finally, there is the one illustrated here (Fig. 1), said to be from a site between Boom and Mussel Creek.

Cases of such finds in Mexico are lacking save for one, from Campeche, in the Museum of the American Indian. As regards Guatemala, a number of these artifacts were found at Uaxactun "below the bottom floor of E plaza," thus surely Preclassic in date (Ricketson and Ricketson 1937, Fig. 119, Pl. 61). Kidder (1947: 19), in a discussion of such artifacts, mentions the discovery of others in a Tayasal cache. Highland finds are confined to one from Kixpek, probably Postclassic in date (University of Pennsylvania Museum NA-11644), and one labeled as from Huehuetenango in the Museum of the American Indian. The latter museum also contains an example from Honduras. Finally and of importance are those described for Costa Rica and Coclé in Panama (Holmes 1888: 33-4, Fig. 24; Mason 1945, Fig. 34 *c*; MacCurdy 1911: 22, Figs. 4, 5; Lothrop 1937, Fig. 64 *q-r*, *f'-i'*). These examples are not to be confused with the small, irregularly edged Chiriquí arrowpoints.

Visually, these "daggers," or whatever they may have been, do help to tie together not only Central and Mesoamerica but the mainland and Haiti as well. Apart from variations in curvature, over-all size, extent of retouching, and flint types, these implements from Haiti to Guatemala to Panama seem to comprise a distinct class. If the whole technique and resultant form are not commonplace in the Americas and are considered sufficiently distinctive in themselves, they offer a degree of artifactual uniformity for the areas of discovery. There is surely little basis for committing oneself to any single explanation of this distribution. But had they appeared in other islands beyond Hispaniola, one might claim them as a true Circumcaribbean trait.

BERLIN, HEINRICH

1940 Relaciones precolombinas entre Cuba y Yucatán. *Revista Mexicana de Estudios Antropologicos*, Vol. 4, pp. 141-60. Mexico.

DIAZ DEL CASTILLO, BERNAL

1928 *The Discovery and Conquest of Mexico*. George Routledge and Sons, London.

GANN, T. W. F. AND M. GANN

1939 Archeological Investigations in the Corozal District of British Honduras. *Bureau of American Ethnology, Bulletin 123, Anthropological Papers*, No. 7. Washington.

HATT, GUDMUND

1932 Notes on the Archaeology of Santo Domingo. *Geografisk Tidsskrift*, Vol. 35, pp. 1-8. Copenhagen.

HOLMES, WILLIAM H.

1888 Ancient Art of the Province of Chiriquí. *6th Annual Report of the Bureau of American Ethnology, 1884-85*, pp. 3-187. Washington.

JOYCE, T. A.

1926 Report on the Investigations at Lubaantun, British Honduras. *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, Vol. 56, pp. 207-30. London.

1932 The "Eccentric Flints" of Central America. *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, Vol. 62, pp. xvii-xxvi. London.

KIDDER, A. V.

1947 The Artifacts of Uaxactun, Guatemala. *Carnegie Institution of Washington, Publication 576*. Washington.

KIDDER, A. V. AND G. F. EKHOLM

1951 Some Archaeological Specimens from Pomona, British Honduras. *Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*, No. 102. Cambridge.

LINNÉ, S.

1934 Archaeological Researches at Teotihuacan, Mexico. *Ethnographical Museum of Sweden*, n.s., *Publication* 1. Stockholm.

LONGYEAR, J. M., III

1952 Copan Ceramics: A Study of Southeastern Maya Pottery. *Carnegie Institution of Washington, Publication 597*. Washington.

LOTHROP, S. K.

1937 Coclé: An Archaeological Study of Central Panama. Part I. *Memoirs of the Peabody Museum, Harvard University*, Vol. 7. Cambridge.

LOVÉN, SVEN

1924 *Ueber die Wurzeln der Tainischen Kultur. I, Materielle Kultur*. Elanders Boktryckeri Aktiebolag, Gothenburg.

MACCURDY, G. G.

1911 A Study of Chiriquian Antiquities. *Memoirs of the Connecticut Academy of Arts and Sciences*, Vol. 3. New Haven.

MANGONES, EDMOND, AND LOUIS MAXIMILIEN

1941 *L'art Precolumbien d'Haite*. Imprimeur de l'Etat, Port-au-Prince.

MASON, J. A.

1945 Costa Rican Stonework: The Minor C. Keith Collection. *Anthropological Papers of the American Museum of Natural History*, Vol. 39, Pt. 3. New York.

MIGUEL ALONSO, ORENCIO

1950 Discovery of a Pre-Columbian Gold Figurine in Cuba. *American Antiquity*, Vol. 15, No. 4, pp. 340-1. Menasha.

MORALES PATIÑO, OSWALDO

1947 Los Mayas de Honduras y los Indígenes antillanos precolombinos. *Tzunpame*, Año 7, Nos. 6, 7, pp. 9-40. San Salvador.

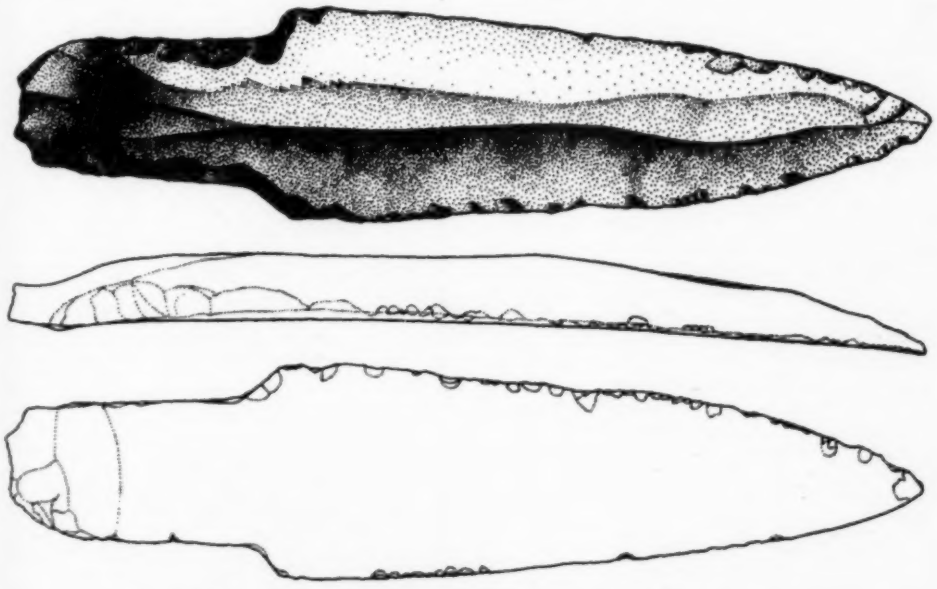
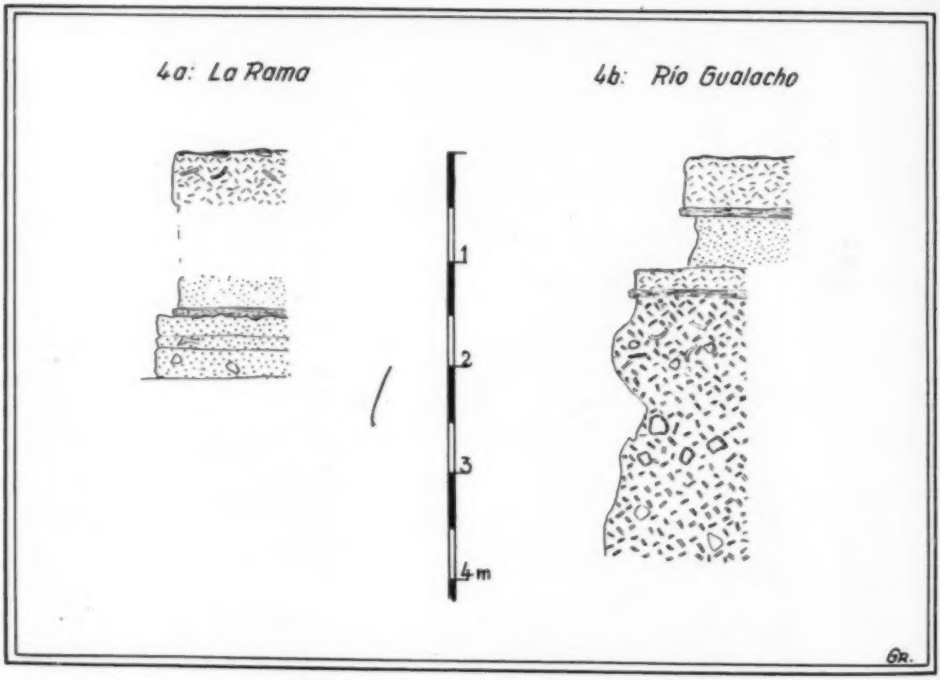


FIG. 1 [Coe]. Tanged blade of banded light brown flint, 15.5 cm. long, from British Honduras. (Univ. Pennsylvania Museum, Cat. MBH-3-2.)



FIGS. 3 AND 4 [Haberland and Grebe].

ware, of which a closely related piece has been published by Lothrop (1926, Pl. 14). The other pear-shaped vase has red fine-line geometric ornament on a grayish surface. On the front is a very interesting modeled jaguar head. Out of its open mouth emerges another head, not very distinguishable due to weathering, but possibly of a turtle. Very similar motifs have been seen on Nicoya Polychrome ware in Managua and San José de Costa Rica.

So both vessels show, at least, a strong southern tendency. We are aware of the fact that the time question in southern Central America is by no means settled; nevertheless, we are inclined to assume that Nicoya Polychrome is not much older than A.D. 1200 and we should therefore like to date the archaeological remains of La Rama to that date, giving hereby a "datum antequem" for the footprints.

In the lowest layer of the Río Gualacho sequence parts of 2 vessels have been found besides sherd material. One vessel has a globular body with restricted neck. It is unpainted, showing the darkish gray color of the clay. The other is a bowl with convex sides and a sharp break towards the lower part of the body. On the neck are some horizontal grooves. The 4 little feet are conical. The interior of the bowl is cream colored, its upper part polished, while the outside is red-orange and highly polished. More than 90% of the sherd material belongs to an orange ware, the color ranging through all shades. The remaining pieces are brown, with the exception of a very few red sherds. Feet are mostly small and conical. Among vessel forms bowls and cuplike shapes are predominant; only a very few sherds can be attributed to globular vessels with restricted neck. No polychrome wares could be found and the only bichrome one is negative painted in the well-known Usulután technique, but this ware is rare too. All these factors seem to indicate that the Río Gualacho complex belongs to a considerable older time than La Rama and most of the other sites found in eastern El Salvador, where polychrome wares generally appear. Because no time sequence has been constructed for this part of Middle America, it is very difficult to give even an approximate dating for this material. From all clues a date of A.D. 500 is the earliest reasonable, and a more recent one would be preferable. Geologically there are some indications that the lowest level of the Río Gualacho sequence is roughly contemporaneous with the imprint-bearing level of La Rama. Therefore, we are inclined to date these footprints between A.D. 200 and 800. With this dating they are very much younger than the only known other example of fossil footprints in Central America, those of Acahualinca near Managua, Nicaragua, excellently described and discussed by Howel Williams in 1953.

LOTHROP, S. K.

1926 Pottery of Costa Rica and Nicaragua. 2 vols. *Contributions from the Museum of the American Indian, Heye Foundation*, Vol. 8. New York.

WILLIAMS, HOWEL

1953 Geologic Observations on the Ancient Human Footprints near Managua, Nicaragua. *Carnegie Institution of Washington, Contributions to American Anthropology and History*, Vol. 11, No. 52. Washington.

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November, 1955

DENTATE AND DENTATE ROCKER STAMPING FROM TABASCO

Heinrich Berlin, in 1953 and 1954, conducted an archaeological survey of eastern Tabasco, Mexico, for the Department of Archaeology of the Carnegie Institution of Washington (Berlin 1954: 293-5). The pottery recovered was brought to the Institution's ceramic laboratory in Mérida, Yucatán, Mexico, for analysis and storage. Early in 1955, while Berlin was in Mérida preparing his final report on the Tabasco survey, I had opportunity to examine the material and note the occurrence of dentate and dentate rocker stamping on a ware called Fine Gray. Berlin found Fine Gray in abundance at the sites of Jonuta and Tecolpan on the Usumacinta River associated with untempered "Z" Fine Orange and a tempered Thin Black. The 3 pottery types are of special interest in southern Mesoamerica because of their wide distribution through trade in Late Classic times and serve as chronological markers in many sites of the western and northern half of the Peninsula of Yucatán.

Fine Gray characteristically has very fine textured, untempered paste of a color ranging from Munsell's Light Gray (7.5YR 8/0, 7/0; 10YR 7/2; 5Y 7/1, 2), through Gray (5Y 6/1, 2, 5/1), to Dark Gray (5Y 4/1). The well-smoothed and low polished surface has the same color range as the paste or the surface may be a slightly darker gray as a result of polishing. Due to lack of color contrast between paste and surface, it is uncertain whether Fine Gray bears a slip. The use of dentate and dentate rocker stamping on Fine Gray is not common and never occurs alone as a decorative technique. Invariably it is used only to fill the background around an incised central motif within a panel or framed band. Two Late Classic Period examples from the Tabasco sites are illustrated, one from Jonuta, Figure 1 *a*, and the other from Tecolpan, Figure 1 *b*, *c*. The first example is a fragment of a cylindrical vase decorated on the exterior with an incised central element and dentate stamping. The stamping tool had at least 17 teeth in a single straight row and had been pressed lightly into the surface before firing while the clay was still in the leather hard stage. Subsequent polishing partly obliterated the punctations. The second example is a tripod rattle bowl with a double bottom. The exterior wall has horizontal, encircling shallow grooves framing the upper and lower limits of a panel, the sides of which are incised lines. A seated monkey, cursively drawn with incised lines, occupies the center of the panel and dentate rocker

stamping fills the background. A 17-toothed stamp similar to the one used on the cylinder was rocked to produce the background decoration.

Dentate rocker stamping has previously been reported from only one site in Mesoamerica, the ruins of El Trapiche, near Cempoala, Veracruz. Here it was found by Garcia Payón (1950, Lam. 12, No. 5) in a Preclassic deposit with other sherds decorated with plain rocker stamping. The published illustration does not clearly show the dentate rocker stamping but both Porter (1953: 48) and I have examined the sherd. Plain rocker stamping occurs sporadically in Mesoamerica from the Valley of Mexico to Honduras during Preclassic times. At La Venta in the Olmec region a few sherds with this decoration were found in deposits of the La Venta period which Drucker in one report (1952: 231-2) equates chronologically with the Tzakol phase (Early Classic Maya) of the Petén; but in a later statement (1955: 30) he places La Venta on a Preclassic horizon. The only Late Classic example of plain rocker stamping on record comes from Tzimin Kax in British Honduras (Thompson 1931, Pl. 48). This is on a cylindrical vase, similar in form to many Fine Gray cylinders, with an incised figure of a seated monkey surrounded by plain rocker stamping.

The use of dentate stamping also is exceedingly rare in Mesoamerica. One questionable Preclassic example is illustrated in a recent publication on the ceramics of Uaxactun (Smith 1955, Fig. 70*b*, *11*). Smith employs the term "rouletting" for the decorative technique I am here calling dentate stamping. Examples of Late Classic period dentate stamping are somewhat more common. Kidder (1954: 9, 10, Fig. 5 *e*) illustrates one example from the small site of Arabia in the Guatamala Highlands, Smith

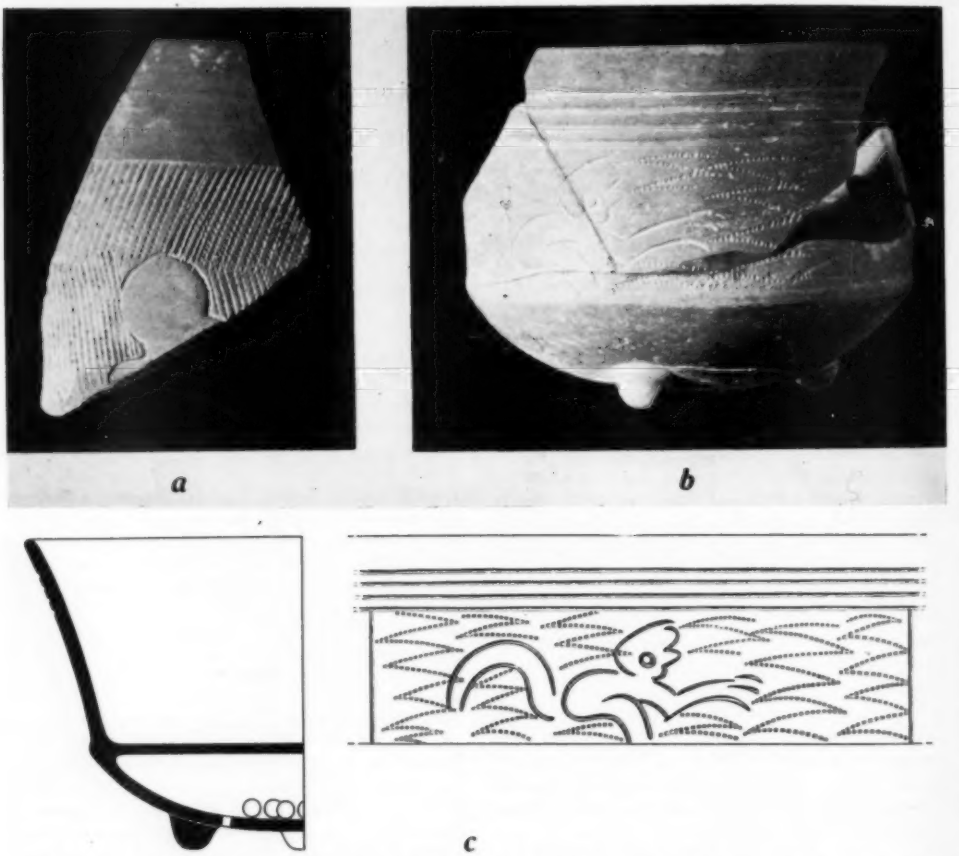

FIG. 1 [Shook]. *a*, fragment of Fine Gray cylinder with dentate stamping, from Jonuta, Tabasco; *b*, Fine Gray tripod rattle bowls with double bottom; single exterior panel is decorated with an incised seated monkey, with dentate rocker stamping as background; from Tecolpan, Tabasco; *c*, section and partly restored drawing of decoration on bowl shown in *b*.

(1955, Fig. 7*d*) another from Uaxactun, and 2 others are published from Yoxiha, Chiapas (Blom and La Farge 1926, Vol. 1, Fig. 189). The latter are Fine Gray tripod rattle bowls, practically identical in form to our Figure 1 *b*, *c*, and each is decorated with an incised seated monkey, and dentate-stamped background. Brainerd and I have unpublished photographs and drawings of several other Fine Gray vessels with dentate stamping from sites in the western and northern parts of the Yucatán Peninsula. Rands informs me that in Palenque he found sherds of Fine Gray and 2 tempered wares, black and brown, with dentate stamping. Also, he observed sherds of Fine Gray and other wares from Piedras Negras, which bore the same type of decoration. It is of interest to note that Yoxiha and Piedras Negras are close geographically to Tecolpan and Jonuta. The last 3 sites are located on the banks, and Palenque and Yoxiha on tributaries, of the Usumacinta River.

This note, however, merely adds fuel to the fire without knowing what is cooking. These decorative techniques, dentate stamping and dentate and plain rocker stamping, apparently never played a major role in Mesoamerican ceramic patterns. Their sporadic appearance at a few widely dispersed localities from Mexico to Honduras during the Preclassic, and towards the end of the Late Classic Period, at a number of sites on the perimeter of the Maya area, leaves much to be explained. Identical decorative techniques have been found on early ceramics of Coastal Peru, and on Hopewellian pottery in the Mississippi Valley and adjacent areas of the United States.

Berlin, Heinrich

1954 Tabasco and Campeche. *Carnegie Institution of Washington, Year Book* 53, pp. 293-5. Washington.

Blom, Frans and Oliver La Farge

1926 Tribes and Temples. 2 vols. *Tulane University, Middle American Research Series*, No. 1. New Orleans.

Drucker, Philip

1952 La Venta, Tabasco. A Study of Olmec Ceramics and Art. *Bureau of American Ethnology, Bulletin* 153. Washington.

1955 The Cerro de las Mesas Offering of Jade and Other Materials. *Bureau of American Ethnology, Bulletin* 157, *Anthropological Papers*, No. 44. Washington.

García Payón, José

1950 Restos de una cultura prehistórica encontrados en la región de Zempoala, Veracruz. *UniVer*, No. 15, pp. 90-130. Jalapa, Veracruz.

Kidder, A. V.

1954 Miscellaneous Archaeological Specimens from Mesoamerica. *Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*, Vol. 5, No. 117. Cambridge.

Porter, M. N.

1953 Tlatilco and the Pre-Classic Cultures of the New World. *Viking Fund Publications in Anthropology*, No. 19. New York.

Smith, R. E.

1955 Ceramic Sequence at Uaxactun, Guatemala. 2 vols. *Middle American Research Institute, Tulane University, Publication* No. 20. New Orleans.

Thompson, J. E. S.

1931 Archaeological Investigations in the Southern Cayo District, British Honduras. *Field Museum of Natural History, Anthropological Series*, Vol. 17, No. 3. Chicago.

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July, 1955

FURTHER NOTES ON COPAN INCENSE BURNERS

No sooner is an archaeological monograph published than certain errors and misinterpretations become so evident that the author wishes he had an opportunity to do the whole thing over. Unfortunately (or fortunately?), this is not possible, so the next best thing is to correct the text from time to time, thus bringing it into agreement with more recent investigations. Short articles in professional journals are ideal for this purpose, as Stephan de Borhegyi demonstrated recently with a note in these pages (Borhegyi 1955: 284-6), concerning certain pottery specimens described in my Copan report (Longyear 1952). Since Borhegyi's observations incidentally involve the dating of several archaeological periods at Copan, some additional comment is obviously in order.

Borhegyi is undoubtedly correct in inverting the coarse ware incensario shown in my report (Fig. 42 *a*) and assigning it to the 3-pronged incense burner complex of the Guatemala highlands (Borhegyi 1955, Fig. 86 *b*). At Copan this vessel was found in deposits of the Archaic period (? to A.D. 300), which would make it fit in best with the 3-pronged incensarios of the Miraflores and Arenal phases of the highlands. Except for the 3 prongs there is little resemblance between the Copan and highland specimens. The former is much more squat, and lacks the side flanges and appliquéd faces which are so characteristic of the burners from Kaminaljuyú (Borhegyi 1951, Fig. 3). These differences, plus the rarity of this form at Copan, lead me to believe that the specimen from the latter site is a local product, made perhaps by some Copaneco who had seen or merely heard of this type of highland incensario.

Borhegyi notes that 3-pronged incensarios appear to be confined to the Guatemala highlands during the Preclassic period and he is, therefore, somewhat disturbed at the early date assigned the Copan specimen. Recent evidence, however, indicates that the Guatemala highlands and Copan were in rather close contact during Preclassic times. I refer especially to the Preclassic Tomb II in Mound E-III-3 at Kaminaljuyú (Shook and Kidder 1952), which yielded vessels so similar to some of the principal forms of the Copan Archaic that mutual contact appears a distinct possibility. The vessels in question are the Usulutan bowls of the Kaminaljuyú tomb (Shook and Kidder 1952, Figs. 72, 73) and the burnished ware bowls of the Copan Archaic (Longyear 1952, Figs. 48, 49). They are by no means identical — at Kaminaljuyú, for instance, the bowls are tripodal, while at Copan they bear 4 feet — but in general shape, details of decoration, and especially in the grooved and

modeled treatment of the rim, the similarities are so marked that connection of some kind is hard to deny. Supposing this to have existed, the presence of a 3-pronged incense burner in the Copan Archaic might not be so strange.

Borhegyi (1955: 285) suggests that some of the Copan Early Classic shallow bowls were really covers for 3-pronged incensarios. With this identification I cannot agree. In the first place, there is little resemblance, either in shape or in placement of the incised decoration, between the Copan specimens and Borhegyi's incensario covers (compare Longyear 1952, Fig. 37 and Borhegyi 1950, Fig. 8 *b*; 1951, Fig. 5 *c-f*). Secondly, these shallow bowls are a numerous and distinct class at Copan, and not, therefore, likely candidates for covers of what must have been at this site an extremely rare, if not unique, type of incensario. I must admit, however, that Borhegyi had no way of knowing this last, since certain considerations — mainly of expense — induced me to omit a detailed sherd count from my report, an omission I now regret.

Borhegyi would assign my Full Classic "comales with interior handles" (Longyear 1952, Fig. 35 *i*) to a form of ceremonial urn known as a "rimhead vessel" (Borhegyi 1955, Fig. 86 *c*). But here again the 3-pronged incensario appears to have the better claim. My "comal" sherds are obviously fragments of a Late Classic 3-pronged incensario, similar to one illustrated by Borhegyi from Quiriguá (Borhegyi 1951, Fig. 4 *b*). The association of the latter vessel with Copador sherds only strengthens this affiliation.

The last comment by Borhegyi concerns a Copan effigy incense burner of the "loop-nose" type (Longyear 1952, Fig. 88 *e*). This I dated as Full Classic, but Borhegyi points out (1955: 286) that the type is characteristic of the Early Classic in the Guatemala highlands. Here is where I really wish I could do the book over! All I can say is that my dating of this vessel is doubtless wrong. It was found by native workmen in a rubbish deposit about a meter below a Full Classic tomb, and may very well have been in Early Classic strata. It was pure carelessness on my part to include it on a plate with specimens of Full Classic date, especially so, since I find that the vessel is not even mentioned in the text!

In conclusion, it would appear that most of the material under discussion here has been correctly placed in the Copan ceramic sequence, and that the dates assigned to the sequence itself have not been invalidated. It is evident, however, that several Copan pottery specimens must be reidentified as a consequence of Borhegyi's studies, and that these new identities lead us to new and significant data regarding the exterior connections of the site. Contact between Copan and the Guatemala highlands evidently began earlier and lasted longer than we had heretofore supposed.

DE BORHEGYI, S. F.

1950 Rimhead Vessels and Cone-Shaped Effigy Prongs of the Pre-Classic Period at Kaminaljuyu, Guatemala. *Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*, Vol. 4, No. 97, pp. 60-80. Cambridge.

1951 A Study of Three-Pronged Incense Burners from Guatemala and Adjacent Areas. *Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*, Vol. 4, No. 101, pp. 100-24. Cambridge.

1955 Comments on Incense Burners from Copan, Honduras. *American Antiquity*, Vol. 20, No. 3, pp. 284-6. Salt Lake City.

LONGYEAR, J. M., III

1952 Copan Ceramics: A Study of Southeastern Maya Pottery. *Carnegie Institution of Washington, Publication* 597. Washington.

SHOOK, E. M. AND A. V. KIDDER

1952 Mound E-III-3, Kaminaljuyu, Guatemala. *Carnegie Institution of Washington, Publication* 596, *Contributions to American Anthropology and History*, Vol. 11, No. 53. Washington.

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August, 1955.

A TUBULAR STONE PIPE (?) FROM SONORA

In December of 1954, Mr. and Mrs. Ruben Emrick of Conrad, Montana, found a broken sandstone object in an arroyo cut located 30 miles north of the town of Empalme near Ortiz in Sonora, Mexico (Fig. 1). They very graciously brought the artifact to the Amerind Museum for examination where it was repaired and studied. The object resembled the tubular stone pipes found in the Southwest (Figs. 2, 3). It had the exterior and inner proportions so characteristic of these pipes, which were produced by drilling out the pipe interior until it resembled a modern venturi tube having a constricted throat. This particular specimen had been constructed from a piece of sandstone by pecking and abrasion.

If it is indeed a tubular stone pipe, it is the largest specimen of its kind ever recorded. The pipe (?) measures 26.7 cm. in over-all length and 9.4 cm. in maximum diameter. It weighs 4 pounds, 14 ounces. The shape and dimensions of the bowl, stem, and dividing constriction are shown in Figure 3. The throat is 1.1 cm. in diameter and 0.7 cm. in length. This constriction may have been formed by the process of double drilling, that is, by drilling the tube from both ends of the pipe. However, it served a real purpose; it restricted the passage of leaves or tobacco from the bowl to the stem. Further, it facilitated the making of smoke clouds. The drill holes consisted of 2 truncated cones connected at the small ends by a short tube resembling a venturi throat. By blowing into the tube the velocity of air passage is increased as the air travels through the throat but actual pressure decreases allowing the leaves to burn evenly and quickly and thus producing quantities of smoke clouds.

Fewkes (1894: 31-3) described the use of similarly shaped stone pipes in the Hopi snake ceremonials at Walpi. The bowl of the pipe was filled with sacred leaves and ignited by placing a live ember in the bowl and by sucking on the stem of the pipe. The smoker then reversed the pipe and placed the lighted bowl into his mouth and blew. Blowing through the bowl of burning

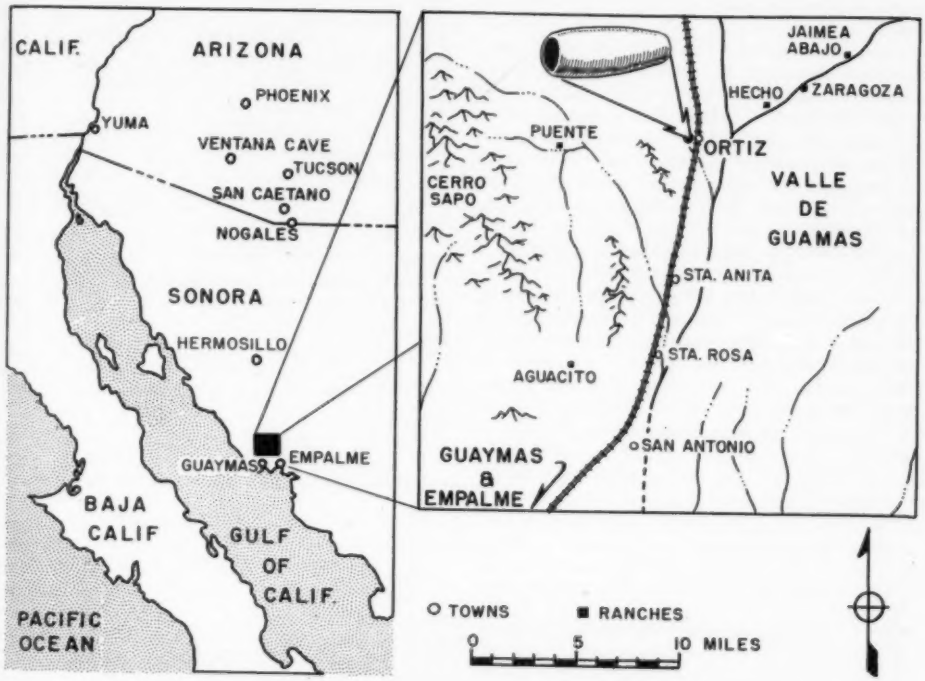

FIG. 1 [Di Peso]. Maps showing provenience of tubular stone pipe (?) from Sonora.

FIG. 2 [Di Peso]. The exterior of the sandstone pipe (?).

leaves created great billows of smoke, ceremonial clouds, and aided the medicine men in creating an atmosphere of magic (Fig. 3).

Fourteen such pipes of a much smaller variety than the Sonoran specimen were recently discovered by The Amerind Foundation in a single cache at the San Cayetano ruin (Di Peso 1957). A number of these specimens still contained the dottle which definitely indicated that they had been used for smoking. Further experiments were made in the laboratory in testing the methods described by Fewkes. Great smoke clouds were easily created and I found, to my surprise, that it did not burn my mouth when the lighted bowl was held to the lips. When the pipe was burning and the clouds were directed to a damp surface they tended to hang and to swirl with the air currents in the room, forming a smoke screen which any medicine man would have used to advantage in performing magic rites.

Haury (1950: 329-32, Fig. 79 *f*) describes a large tubular pipe of arkosic sandstone which was found at Ventana Cave. This specimen measured 18.4 cm. in length and 7 cm. at mid-diameter. It contained dottle in both the bowl and the stem end of the pipe and the venturi throat was located at mid section in the pipe.

The Sonoran specimen is much larger than the Ventana specimen and contained no evidence of having been smoked. After it was repaired I chanced to place the artifact to my mouth and blew through the stem end. I found that the lips easily fitted the interior cone shape of the stem and that the passage of air through the venturi throat caused a deep bass sound to be emitted. The sound was produced with little effort and closely resembled the sound of a *strombus* shell trumpet. One cannot help but wonder if the artifact could not have been used in this manner.

I wish to thank the Emricks for allowing the Amerind Foundation Museum to study the pipe (?) and to retain it for exhibition purposes. I also wish to thank Barton Wright of the Amerind Staff for the drawings accompanying this article.

Di Peso, C. C.
1956 The Upper Pima of San Cayetano del Tumacacori. *Amerind Foundation*, No. 7. Dragoon. (In press.)

Fewkes, J. W.
1892 A Few Summer Ceremonials at the Tusayan Pueblos. *Journal of American Ethnology and Archaeology*, Vol. 2. Cambridge.

Haury, E. W.
1950 *The Stratigraphy and Archaeology of Ventana Cave Arizona*. University of Arizona Press and University of New Mexico Press, Tucson and Albuquerque.

Charles C. Di Peso
The Amerind Foundation, Inc.
Dragoon, Ariz.
July, 1955.

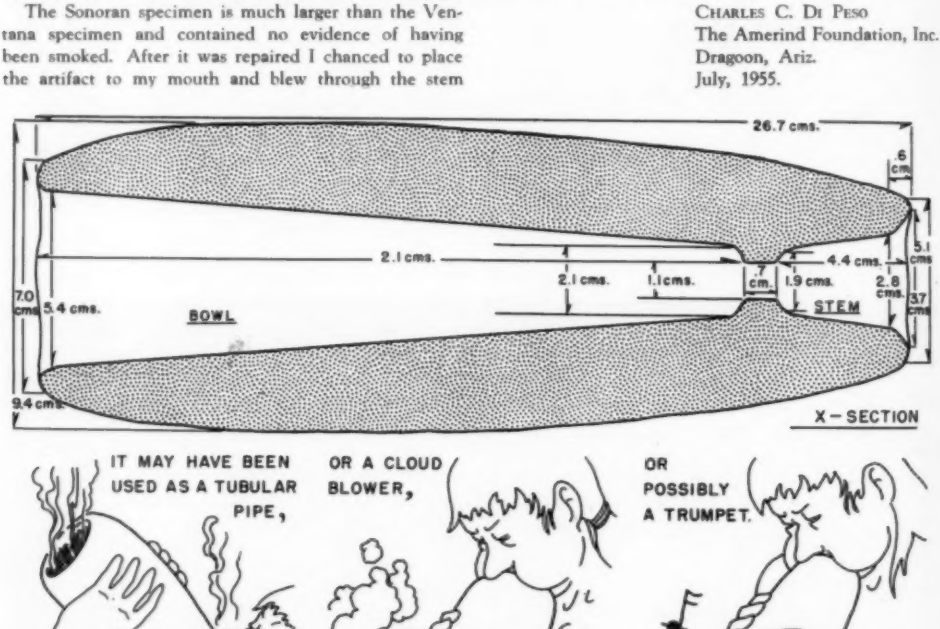

Fig. 3 [Di Peso]. Cross section of tubular stone pipe (?) and possible methods of use.

PADDLE AND ANVIL APPEARANCE OF SOME SONORAN POTTERY

While engaged in recent ethnological field work in the San Miguel Valley of northeastern Sonora,* I had occasion to observe a potter at work. This area, in aboriginal times, was inhabited by the Opata Indian tribe. Today it is predominantly mestizo racially, and culturally is a blend of aboriginal, early Spanish, and Mexican traits. I was assured by many people that the potter, who is extremely Indian in appearance, was "pura indigina."

The pottery in use in the village comes from many areas. There is the Guadalajara earthenware so common in Mexico, manufactured china, and a variety of handmade types from throughout Sonora. The pottery made in the village is a buff colored plainware, fairly thick walled, with coarse temper. The core is usually the surface color, rarely black.

From examination of the pottery made in the village I had been unable to determine the exact technique used in the forming and finishing of the vessels. It seemed as if they were polished and scraped, though many had the appearance of what I thought paddle and anvil pottery should look like. In the potter's yard and house I saw several pots which, upon cursory examination, led me to believe that while scraped, they also had been worked on by paddle and anvil. While showing irregular striations from a scraper, small plane surfaces on the exterior were backed on the interior with rounded indentations about the diameter of hens' eggs. On both the interior and exterior they showed evidence of polishing with some smooth tool. These pots, which had been made by the old lady in previous years, showed more distinct evidence of the paddle and anvil than any others which I saw in the village.

Observation of the manufacture of the pottery revealed the following technique. The base of the pot was molded from a ball of moist clay about the size of a cantelope. This ball was first flattened on one side, then hollowed by fist action, then scraped with a piece of gourd to thin the walls. When the molded section achieved the desired form, a round, fat coil was pinched onto the rim, forming one circumference. This coil, formed on a wooden tray and made of the same material as the base, was thinned by being squeezed and pulled between the hands, and then scraped. Like the molded base, the new section was smoothed by the potter's wet hand, removing most of the striations caused by the scraper. Two more coils were added and thinned, the pot finally reaching the desired height. The rim was formed by turning the pot with the left hand, while the right was bending over the top 2 inches of the olla. Simultaneously the right thumb was pushing in the neck of the vessel, gently constricting the neck and giving the pot a slightly flaring rim. When this shaping was finished, the entire pot was again scraped with the piece of gourd, backed by the bunched fingers of the potter's left hand. As the scraping continued, small indentations were made on the interior by her fingers. When the gourd bit too deeply, as it frequently did, flat surfaces were formed on the outside. Finally when she was satisfied with her work, she went over the entire pot with her wet hand. When fairly dry it was polished with a smooth stone.

On looking at a companion piece of the pot E. B. Sayles, Curator of the Arizona State Museum, stated: "The coiled portion of the pot (the upper part), in particular, has all the appearance of paddle and anvil pottery as frequently defined." The olla has distinct flat surfaces on the exterior and small hollowed areas on the interior, this feature being more marked on the upper portion of the vessel than the lower. In reference again to the upper, coiled portion Sayles remarked: "As sherds there wouldn't be any doubt that this would be classified as paddle and anvil." This was further corroborated by C. L. Tanner of the Department of Anthropology, University of Arizona, who also stated that as sherd material it would be indistinguishable from what is usually classified as paddle and anvil.

This paradox, a pot made by coiling and scraping which appears to have been formed by paddle and anvil, is explained, I believe, by the method of scraping and smoothing employed by the potter. The bunched finger tips, and the deep biting scraper formed the hollows and the plane surfaces, then the wet hand removed all or almost all evidence of the fingers and the piece of gourd. This was aided further, by the action of the smooth stone polisher, with the result that coiling was not readily apparent. The remaining evidence points to the paddle and anvil.

Though the pottery made by this old lady is below standard for the community, other pots I have seen are quite similar in appearance. The worker was trying to make a smooth, round pot, but she was unable to fully achieve her goal. The results achieved by this potter point to the danger, in this area at least, of assuming the techniques used in pottery manufacture when the process is not observed.

ROGER C. OWEN
Tucson, Arizona
July 20, 1955

* This field work was supported in part by a grant from the Eben F. Comins' Fellowship Fund, Department of Anthropology, University of Arizona, Tucson.

FIRED CLAY FIGURINES FROM SAN DIEGO COUNTY, CALIFORNIA

In San Diego County clay figurines occur sporadically throughout most of the intermediate valleys, inland valleys, and mountain regions, and although of rather wide areal distribution they seem to be numerically rare.* In addition to those described in this report,

* The writer wishes to express his appreciation to C. W. Meighan, University of California at Los Angeles, for his generous help with this report. Raymond C. White, University of California at Los Angeles, offered many helpful suggestions, and data from his detailed study of Luiseño ethnology. Mr. and Mrs. Verne Jones, Valley Center, California, were most generous with their time and artifacts; 10 figurine fragments have been found by them at a site on their ranch. Mrs. Billie James kindly permitted the writer to examine figurine fragments found at the Jones site by herself and Mr. James prior to selling the property.

specimens are known to be in the possession of the Museum of Man, San Diego, and the Cuyumaca State Park Museum. A probable fragment was found by B. F. McCown in the excavations at Temecula. Other finds are occasionally reported but have not been documented or described. This report describes a total of 17 whole and fragmentary figurines from 8 sites in the central watershed of the San Luis Rey River, northern San Diego County. All were surface collected except for specimens from Valley Center, Site 29, which were excavated by their present owner, Verne Jones, in the course of various farm activities.

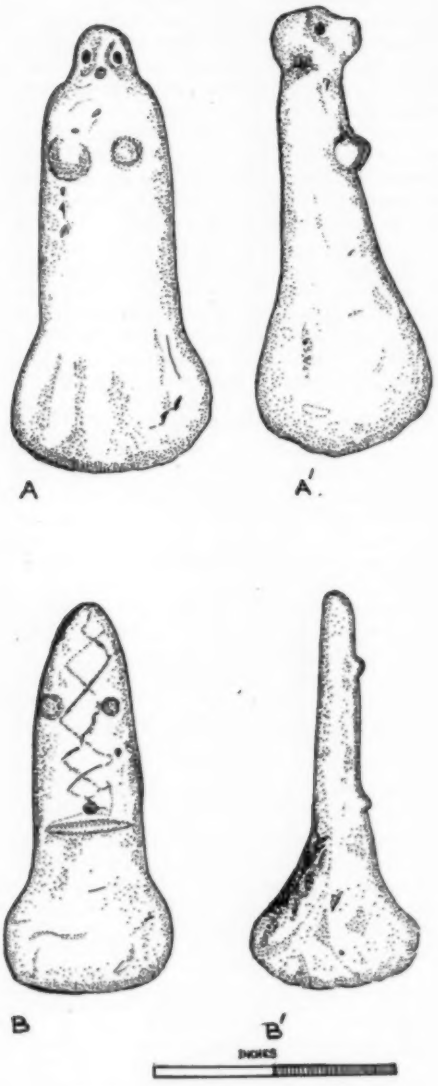

FIG. 1 [True].

The figurines were found in all cases on village locations which agree in form and content with San Luis Rey II, described by Meighan (1954) and tentatively dated by him in the 18th and 19th centuries. In 2 instances, at Rincon 4 and Valley Center 29, the figurines were found on an outlying occupation area adjacent to the main village. In both cases the sites appear to contain a heavier than normal concentration of sherds.

Anthropomorphic forms predominate, with only 3 animal figures known. Two general types are noted, those with bulbous terminations, and those which appear to have more tapering terminations. Ten specimens have blunt or rounded terminations, with one anthropomorphic and 2 animal figures showing breaks indicating probable limb terminations. Rounded fragments have been found that probably represent limb segments. Decoration in both types is limited to incising with no evidence of appliqué elements found on local specimens. The specimens displayed by the San Diego Museum of Man and Cuyumaca State Park Museum have appliqué elements for eyes. In general they do not resemble specimens described here. The dissimilarities between local forms and the figurines displayed in the San Diego Museum of Man with their appliqué "coffee bean" eyes are obvious. In spite of this some Yuman or Hohokam southwestern influence is no doubt present in the sample. All local specimens are fired. Yuman and Hohokam figurines are also fired, while most figures from Morss's Northern Tradition area are unfired (Morss 1954). In attempting the brief comparisons of local and Southwestern figurines the writer has leaned heavily on Noel Morss's monograph. The terms Northern and Southern Traditions are his and apply to figurine styles and areas of the Southwest. The naturalistic, limb-terminated anthropomorphic (Fig. 2 *E*) and animal forms (Fig. 3 *G, H, I*) are probably similar to specimens described from the Santa Cruz, Gila Butte, and possibly Snaketown phases of the Colonial and late Pioneer periods of the Hohokam. The apron termination (Fig. 2 *D*; Fig. 3 *F*) is described as typical of the Fremont area of Morss's Northern Tradition and similar to a specimen from the Pine Lawn period of the Mogollon (Morss 1954: 100, Fig. 23 *h*). In general, over-all appearances suggest both Basketmaker III and early Hohokam. Morss describes elements common to both of his Southwestern traditions as well as to some nonsouthwestern areas (Morss 1954: 27). He attributes this to a possible community of origin and influence from the south in post-Basketmaker times. The wide variation in local forms showing resemblances to both of Morss's Southwestern figurine traditions and to figures described by Heizer from central and northern California is apparent (Heizer and Beardsley 1943). However, they do not seem to be conforming to any common pattern. There exists then an as yet undefined chronological or areal variation in figurines from Southern California.

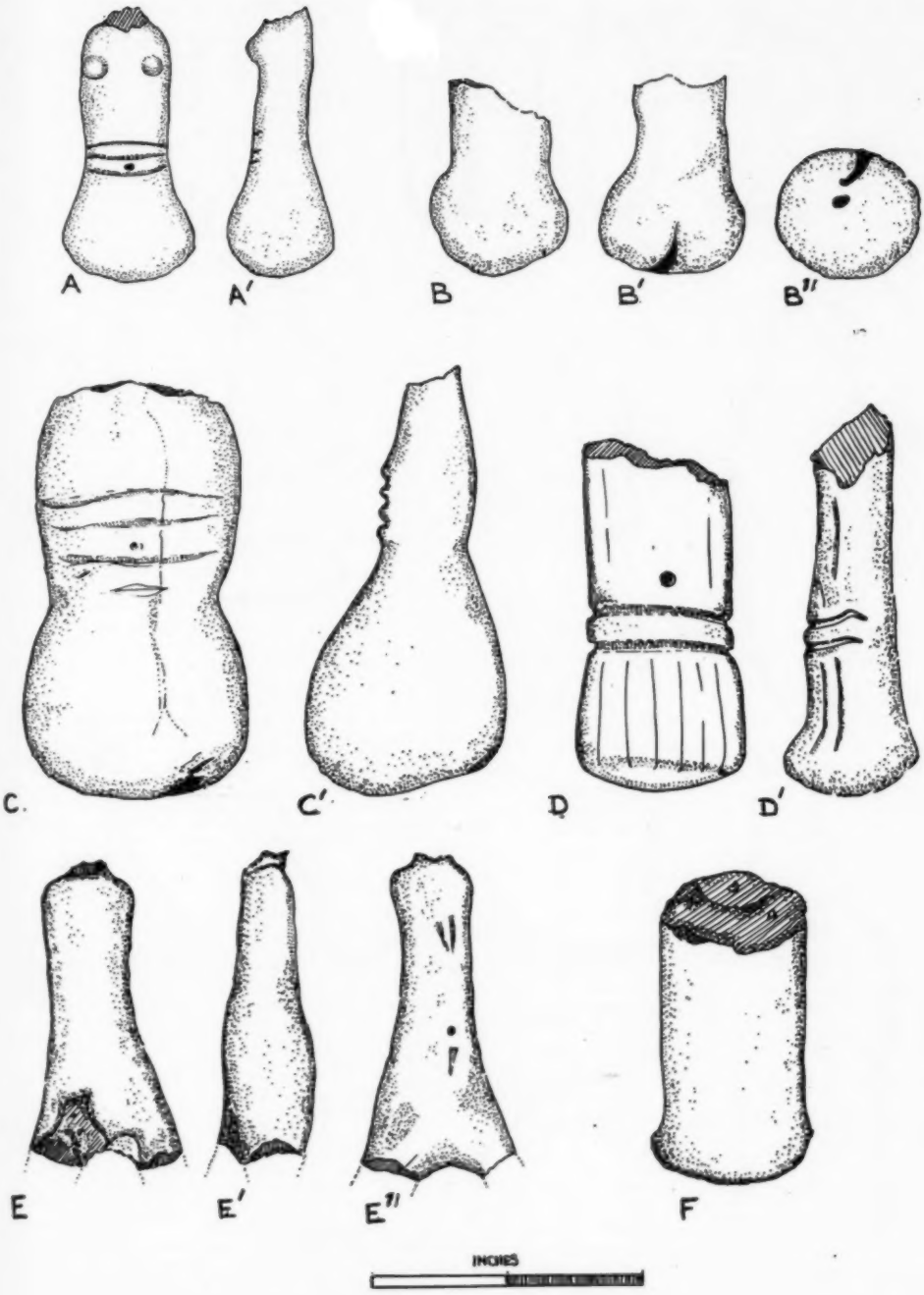

Fig. 2 [True].

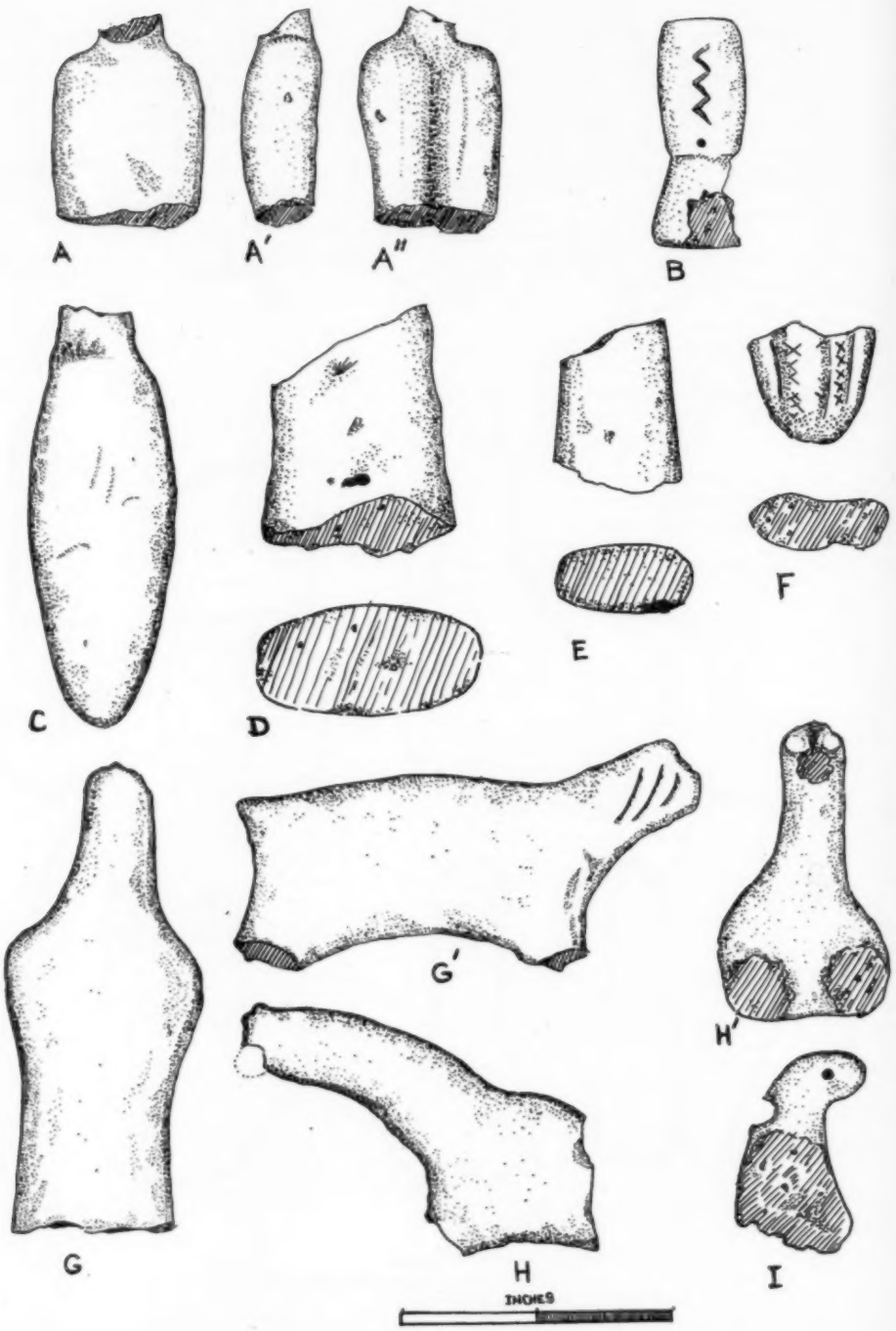

FIG. 3 [True].

Number 1 (Fig. 1 *A*, A^1) is a female figurine, gray-brown in color, with a slightly gritty sand finish with little smoothing. Little or no temper is noted and the texture of the material is fine. The head is modeled with muzzle-like features. There is no neck. Eyes are represented by puncture marks, shoulders are well defined, and breasts are represented by conical swellings which appear to have been bonded to the torso. The basal termination is bulbous and neither smoothed nor decorated. The section tends to be round rather than flattened. The total length is 8.9 cm., width at shoulders 2.5 cm., and width at base 4.0 cm.

Number 2 (Fig. 1 *B*, B^1) is a female figurine of brownish color and sandy finish and texture, with little smoothing. Feldspar and quartz inclusions or temper are noted, but they are less than 1 mm. in diameter. The torso tapers from a rounded head to bulbous base without a break and is lacking in limbs or shoulders. Sex is indicated by slight swellings in the upper third of the torso; these appear to have been pinched and modeled from the same piece of clay as the torso. A navel is indicated by a puncture mark above a horizontal ridge crossing the lower midsection. The cross section flattened and tapered except for the basal bulb which is rounded. Decoration consists of incised diamond elements between the breasts. Four punctures are found on the bottom of the basal bulb. Total length is 8.2 cm., width at breasts 1.9 cm., width at navel 2.3 cm., and width at the base 2.5 cm.

Number 3 (Fig. 2, *A*, A^1) is a headless torso of brownish gray colored fine-grained micaceous material, not smoothed. The upper portion suggests that shoulders were present although they are not descernible on the remaining fragment. The waist is shaped with 3 incised grooves above it on the front which do not extend to sides or back. The section is somewhat oval except for the bulbous termination which is rounded. Viewed from the side, the torso tapers slightly to the termination with a waist indentation on the dorsal as well as the ventral side. A crack runs the length of the torso where it was dropped and repaired by its present owners; another fracture line is noted on the terminal bulb, but appears to be only superficial. A slight puncture is noted between the 2 lower incised lines that could indicate a navel indentation. Total length is 7.2 cm., width at top of torso 3.6 cm., and width at base 4.1 cm.

Number 4 (Fig. 2 *B*, B^1, B^2) is a headless torso, brown in color, partially smoothed but not finely finished. The slightly micaceous clay contains some sand temper. Shoulders are apparent and the torso is well modeled with a well defined spinal curvature. Breasts are indicated by swellings in the chest region; these seem to have been modeled from the original clay and are not bonded to the torso. The termination is bulbous and without markings. Horizontal lines are incised across the midsection. A navel puncture is located between the 2 lower lines, which do not extend around the sides of the body. The total length is 4.9 cm., width at shoulders is 1.6 cm., width at breasts 1.7 cm., and width at the base 2.4 cm.

Number 5 (Fig. 2 *C*, C^1) is a probable female figurine, a semi-smoothed basal fragment, with medium-grained finish, and some fine grit temper. It is of brownish color with a trace of red pigment remaining, and no other decoration. A possible indication of female genitalia is incised into the base; this is the only suggestion of sex, as the chest region is missing. Total length is 3.7 cm., width at center 1.6 cm., and width at base 2.5 cm.

Number 6 (Fig. 2 *D*, D^1) is a basal fragment, slightly smoothed, although the finish is somewhat gritty. Color is gray brown. Some sandy inclusions are present, all under 1 mm. in diameter. A flattened oval in section, this fragment terminates in a rounded, slightly flared bulbous base. The back is flat and unmodeled except for a slight vertical indentation. A navel is indicated in about the center of the ventral side. Decoration which may represent clothing is shown by 2 horizontal incised lines in the lower midsection. Below these, 7 vertical lines are incised and seem to represent an apron or skirt. Above the horizontal lines multiple crosshatching is present between 2 incised vertical lines. Light crosshatching extends around the sides of the torso beyond the vertical lines but does not reach the back at any point. The back is devoid of all marking. A hole 4 mm. in diameter is located on the base of the termination. Length is 6.8 cm., width at top 2.9 cm., and width at termination 3.2 cm.

Number 7 (Fig. 3 *A*, A^1, A^2) is an upper torso fragment, brownish red in color, with a gritty finish with little or no smoothing. Oval in section, it tapers slightly from shoulders to midsection break. The back is modeled with a vertical depression from shoulders to midsection. It has no design or markings. Length is 3.9 cm., width at shoulders 2.8 cm., and width at midsection 2.5 cm.

Number 8 (Fig. 2 *E*, E^1, E^2) is a headless and legless torso, brownish red in color, with a semismoothed finish. It has a fine-grained texture, with some small inclusions, slightly micaceous. The torso tapers from shoulders to bulging midsection and terminates with what appear to be legs, broken off at the base of the torso. No decoration is present. A slight puncture, possibly representing a navel is located in the center of the torso. Length is 5.9 cm., width at shoulders 1.6 cm., and width at widest point 3.2 cm.

Number 9 (Fig. 3 *C*) is a cylindrical torso fragment of fine-grained, slightly micaceous material. The torso tapers from the neck to a bluntly pointed termination with no modeling or decoration. Length is 7.0 cm., width at shoulders 2.2 cm., and diameter at neck 1.1 cm.

In addition to the above described figures a total of 5 additional fragments are shown (Figs. 2 *F*, F^1, *G*; 3 *B*, *D*, *E*, *F*). Of these, three are partial or complete terminations, and two are torso midsections. Other fragments of fired clay have been found that are not obvious vessel fragments and are believed to be figurine fragments. However these are not complete enough to determine original forms.

Animal representations consist of 3 fragments found on the Jones site (Fig. 3, *G*, G^1, *H*, H^1, *I*). Of these, two appear to be large quadrupeds and the third, which is only a neck and head, resembles a bird. All are fired clay, gray-brown to brownish red in color with a slightly smoothed gritty finish.

Scarcity of specimens and lack of knowledge among the Luiseño does not suggest common usage through any great depth of time. This plus obvious similarities to Southwestern figurines makes it unlikely that local figurine development took place independent of the Southwest.

The range of figurine types found in the Mogollon, Hohokam, and Yuman cultural areas, plus possible post-contact Mexican influence in the area could easily account for the present variety of figurine forms here. The similarities of local figurines to Basketmaker III and some Fremont figures, as well as to those found in central and northern California, are such that the possibility of influence from Morss's Northern tradition area can not be ignored. Early introduction from the Northern tradition area, some local evolution, and a late Yuman pottery influence coupled with strictly limited usage could account for both the variety of forms and scarcity of specimens. Although considered unlikely at present, lack of figurines in San Luis Rey I sites could be attributed to as yet incomplete investigation of the complex and possibly to poor preservation of unfired figures on open sites.

Little is known of the functions of figurines locally. Definition of their uses is complicated by the many variant forms, uncertain origins, and differences in chronological placement. Modern Luiseño informants' data are sketchy and the location of the figures archaeologically gives little clue to their use. Lacking a stratigraphy and specimens from earlier sites, all the present figures must be considered somewhat contemporaneous. For the most part modern Luiseño informants deny knowledge of the figurines found. It seems unlikely that

they represent children's playthings, as such toys would surely be more common. Reluctance of informants to discuss figurines or outright denial of their existence does not seem justified for common toys, particularly when these same informants can and do define the use of nearly all known elements of the San Luis Rey complex. It has been noted that such descriptions become increasingly difficult to obtain as the artifacts or elements approach or become related to certain religious rites. However, 2 informants have stated that they were used as hexing devices by witches and shamans (Raymond C. White, personal communications 1955). It was stated that at one time all such devices were made of clay but that in postcontact times cloth materials were substituted. The use of such cloth figures for hexing purposes in the old days is commonly admitted. Death or illness is reported to result from practices involving such dolls.

Association of figurines and increase rites in many early agricultural economies has been well documented, but lacking direct archaeological evidence or ethnological information the use of figurines in increase rites locally is unlikely. However, ownership of hunting grounds, oak groves, and other seed sources by individuals, families, and village complexes, suggests a grove management situation that was conceivably not far removed from early agricultural economies in other areas. Ceremonies to increase the acorn crop are said to have been performed in the old days. Details are vague but the described pattern is consistent and has been cross-checked through several informants. No living person is known to have the knowledge needed to perform this rite. The presence of a seed impression suggestive of a small acorn was found in a bulbous termination fragment recovered from Rincon 67. This is the only suggestion of local associations between figurines and increase rites. Admittedly this tiny fragment from a single site is far from adequate evidence of figurine function in increase rites. However, all evidence, however minute, deserves consideration in any determination of origins and functions of figurines in California.

HEIZER, R. F. AND R. K. BEARDSLEY

1943 Fired Clay Human Figurines in Central and Northern California. *American Antiquity*, Vol. 9, No. 2, pp. 199-207. Menasha.

MEIGHAN, C. W.

1954 A Late Complex in Southern California Prehistory. *Southwestern Journal of Anthropology*, Vol. 10, No. 2, pp. 215-27. Albuquerque.

MORSS, NOEL

1954 Clay Figurines of the American Southwest. *Papers of the Peabody Museum, Harvard University*, Vol. 49, No. 1. Cambridge.

D. L. TRUE
Pauma Valley, Calif.
May, 1955

RADIOCARBON AGE OF THE DAMARISCOTTA SHELL HEAPS *

The large oyster shell heaps on both sides of the Damariscotta River, just north of the towns of Damariscotta and Newcastle, Maine, have been known for many years and both geologists and archaeologists have speculated about their age. During the summer of 1955 I made 2 collections of *Mya* shells from the largest shell heap on the west side of the river (Glidden estate) for radiocarbon age determinations. *Mya* shells, though not common in these shell heaps, were selected for this purpose because they have been much less affected by weathering than the thinly laminate oyster shells.

One collection came from a small pit approximately 6 feet above mean high tide level in the river and the other from a small pit near the top of the mound, roughly 6 feet below the highest point. According to Meyer Rubin of the U.S. Geological Survey's Radiocarbon Laboratory, the shells collected near the base of the heap gave an age of 1710 ± 160 years (sample W-337) and the shells collected near the top of the heap, 1610 ± 160 years (sample W-342). These ages were computed on the basis of shell activity equivalent to modern wood; they were not corrected to C^{13} activity.

J. L. Kulp, Lamont Laboratory, Columbia University, determined for me the radiocarbon age of some oyster shells (sample L-160), which I collected several years ago from a small pit near the base of this same shell heap. These shells gave an age of approximately 1600 ± 220 years. Although these oyster shells were carefully cleaned and only the soundest parts used, they were in part weathered and would therefore be expected to give an age somewhat younger than the true age. The weathered oyster shells could have been changed only by replacement of carbonate from rainwater percolating down through the overlying shells; no older carbonates are admissable because the mounds stand above all the surrounding terrain.

I have corresponded with both Frederick Johnson and Douglas Byers of the Robert S. Peabody Foundation for Archaeology about the archaeological significance of these dated shell samples. They inform me that the Glidden Shell Heap, like other shell heaps, is made up of a series of overlapping piles of shells and that artifacts were not plentiful. Although the dated shell collections cannot be related to any of the artifacts or to the complex stratigraphy, Johnson believes that they do indicate, in a general way, an age for some kinds of early Point Peninsula pottery found in Maine. The dates indicate also that the heaps may have started to accumulate soon after the beginning of the Christian era. Moreover, as the dated samples came from pits near the base and near the top they suggest that at least the part of the Glidden Heap close to the river may have built up rather rapidly — within one to a few hundred years.

W. H. BRADLEY
U.S. Geological Survey
Washington, D.C.
April, 1956

* Publication authorized by the Director, U.S. Geological Survey.

EUROPEAN KNIFE HANDLES AT PECOS— A CORRECTION

It seems somewhat tardy to set right a mistake made 24 years ago, especially as I learned that it was one not very long after. But better late than never.

The matter concerns some tubular carved bone objects I published in *Artifacts of Pecos*, page 263, and Figure 220. I was at a loss as to their use, but said that although I had no clue to their exact period, one was certainly prehistoric. That was where I was wrong, possibly led astray, at least I hope so, by the piece in question having gone down a prairie-dog hole. That happened often at Pecos. I discovered my error on being shown the archaeological collections in the Museum at Rochester by Arthur Parker, where my surprised eye lit on several identical specimens, in some of which, as I remember it, were set iron knife blades! At any rate, Parker told me they were found in historic Iroquois sites.

I, of course, meant to do something about this, but I forgot all about it until a recent return to Pecos, unfortunately only in spirit. So I wrote to William A. Ritchie at Albany, who I was sure would know all about these things. He not only did, but he sent me the fine photograph (Fig. 1) of examples from the New York State Museum. They are from burials on the R. G. Dann Seneca site, Honeoye Falls, Monroe County, New York, believed to have been occupied between 1650 and 1675. Some, Ritchie writes, would date it after 1687, but of this he is doubtful. He states that to the best of his knowledge this type of knife first appeared in the New York Iroquois country about 1640. He further remarks that it has been figured by one poorly illustrated example on page 448 of F. Houghton's *The Seneca Nation from 1665 to 1687* (*Bull. Buffalo Soc. of Natl. Scis.*, Vol. 10, No. 2, 1912).

On Ritchie's advice I wrote Kenneth E. Kidd of the Royal Ontario Museum of Archaeology, who is making an intensive study of European trade objects in Northeastern North America. He tells me that in the 17th century France was a very heavy producer of cutlery. Thus it seems probable that this type of elaborately handled knife is of French origin and that it was exported to Canadian French traders to the Iroquois. The Pecos specimens may accordingly be from knives that had found their way from Canada to the Southwest in tribe-to-tribe barter. Or they might have come via Spain

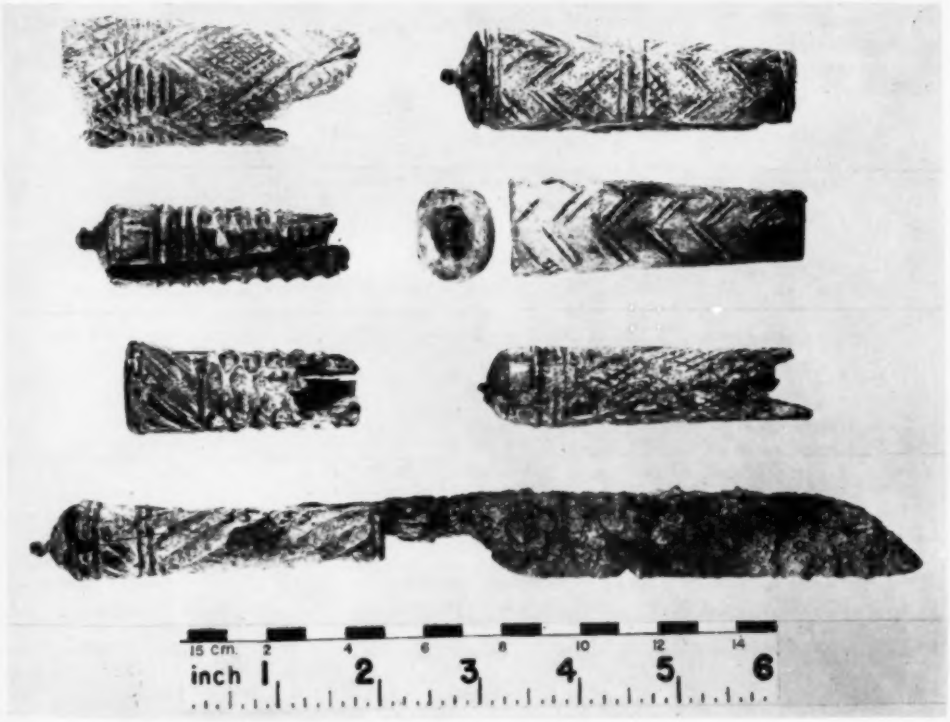

FIG. 1 [Kidder]. Knife handles of European origin from a 17th century Iroquois site in New York State, similar to knife handles found at Pecos, New Mexico.

to Mexico and so to the Pueblos. I have, however, seen none in Mexican collections.

I also consulted Arthur Woodward, our greatest authority on European tradegoods. He has written me of the illustration of a fragmentary handle found by C. C. Di Peso at the Sobaipuri site of Quiburi, southeastern Arizona (*Publ. 6, Amerind Foundation*, p. 228). The piece has the same forward taper as those from Pecos and the Iroquois country and its butt is encircled, like some of them, by incised zigzags. From Quiburi there is also figured an iron knife blade duplicating both Ritchie's and mine (*Artifacts of Pecos*, Fig. 250 *a*).

A. V. KIDDER
Peabody Museum
Harvard University
June, 1956

AN AMERICAN EOLITHIC?

In *Notes and News* in 1953 in AMERICAN ANTIQUITY (Vol. 19, No. 1, pp. 100-1) there is the following statement: "If interglacial artifacts are present in America, they will of necessity be of very crude nature." This follows a discussion of the specimens found and described by George F. Carter in California, Carmen Baggerly in Michigan, and others in California and Texas. Amos Green of Eau Claire, Michigan, has recently collected and submitted to us at the University of Michigan a number of specimens equally as crude as those from the West and Southwest.

The use of the word "interglacial" by archaeologists in the United States has currently a different meaning than it does in application to the European Pleistocene divisions. Here, all the evidence of human occupation is dated after the last phase of the Wisconsin, or last glaciation, and American archaeologists have independently of one another and somewhat unthinkingly defined "interglacial" as the third interglacial of Europe, apparently in the belief that any traces of human activity here that antedate the Wisconsin could not be earlier than the immediately previous interglacial. These suppositions are not necessary. If man was here in the third interglacial there is no reason he could not have been here in the first one, and he could have entered the New World during the last glaciation and subsequently found his way south of the ice edge before the end of that glaciation. Probably nothing of the sort happened, but the occurrence of upper paleolithic types at North Cape, Norway, and along the north coast of Siberia indicates that man lived along the north edge of the last glacier, where it broke up into icebergs and exposed the shore in places, and he could have wandered into North America without knowing it.

As to the interglacial occupation of the New World in the sense in which the word is used in the above quotation, the artifacts would certainly not be crude in the way those found by Carter, Baggerly, and Green are crude, because, unless the making of stone implements arose here separately from any contact with the Old World, this activity must have carried on the traditions of the Old World. There, the third interglacial is the period of the upper Acheulian, the Levalloisian, and the Mousterian, with certain elements of the blade industries already present both in Europe and in the Near East. But these industries of the Old World third interglacial are anything but crude. In a good many of the textbooks the Mousterian has been described as a degeneration of something else, with borrowing from the Acheulian, but actually some of the Mousterian chipping is exquisite and there is evidence that in some places it was ancestral to the Solutrean. There is not the slightest resemblance between any of these Old World third interglacial manifestations and the finds attributed to the same period in the United States. These are "eolithic" in character, and the question of their production by man is unsettled. It is easier to accept eoliths in the Old World as artifacts, because of the presence there of fossil Miocene apes and of lower Pleistocene human fossils. With the necessity of deriving the human stock of the New World from the Old, eoliths in the third interglacial here, or in any period, are very improbable. I would say impossible, except that my remarks are at the hypothetical level and one never knows when observers like Carter, Baggerly, and Green will come up with some facts. I am glad they are working on the problem.

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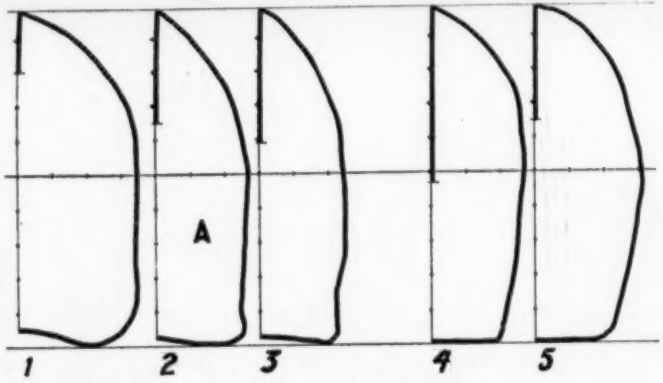
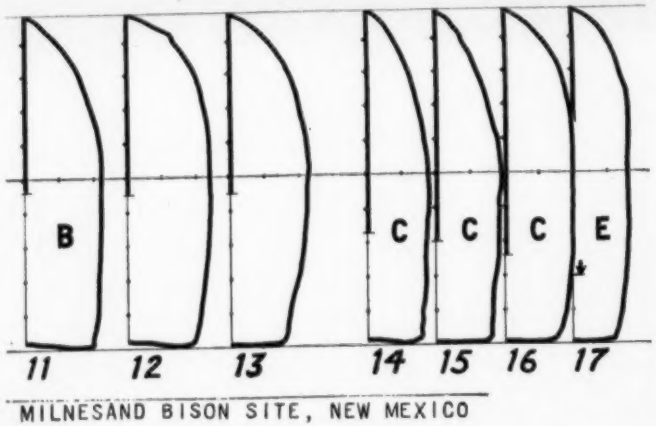
July, 1955

BROWNS VALLEY AND MILNESAND SIMILARITIES

For the student of the archaeology of the Plains, Browns Valley Man has been an engima. Loosely dated between 8000 and 12,000 years ago by Jenks (Jenks 1937a: 17) it has remained in splendid isolation — an important group of artifacts found in a burial site with the skeleton of a man who may be presumed to have been their maker — with, heretofore, no known close affiliations. That he hunted the giant bison has been inferred in an unpublished script by Lloyd Wilford to accompany a filmstrip on Minnesota archaeology being prepared by the University of Minnesota. This must be presumed to be based on one or both of 2 midden sites of giant bison dug by Jenks, Wilford, and Eddy. One of these has been described in a brief note in Science by Jenks (Jenks 1937b: 243-4). The other site has no published data.

The Science Museum in the course of preparing a reference file of point profiles (Powell 1955) of Minnesota projectile points from archaeologically known sites completed such a series for the Browns Valley site some time ago. This project involved a careful study of the points themselves as well as reduction of the edge shapes to point profiles similar to those illustrated here. We were thus overjoyed to find in Sellards' Milnesand bison site from New Mexico (Sellards 1955: 340-2) a family of similarly shaped and fashioned points and





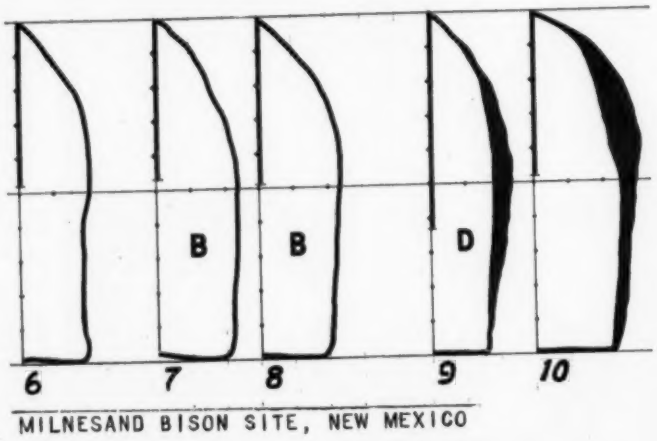


FIG. 1 [Powell]

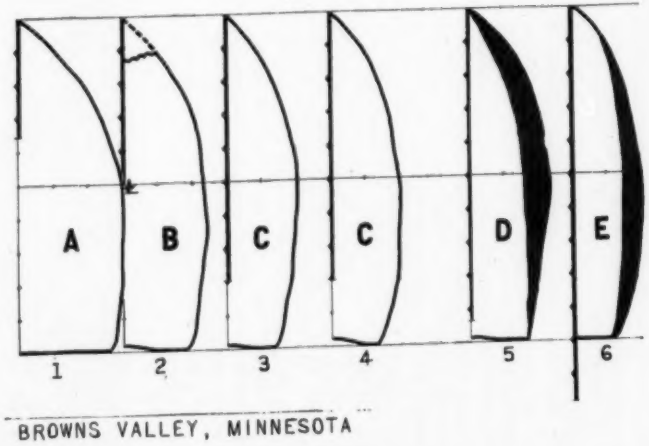


FIG. 2 [Powell].

knives. A comparison of the point profiles of the Milnesand points prepared from Sellards' splendid drawings with those prepared by Jenks for the Browns Valley points is made in Figures 1 and 2. As with Browns Valley the points from Milnesand form a family of shapes in which as the length grows shorter the relative proportion of width to length increases.

Shape A. The shortest Browns Valley point (Fig. 2, *1*) is about 3½ cm. long (see heavy line at the left of each profile for the length in centimeters). The ratio of maximum width to length will be seen to be 6 : 10. From Milnesand a point of similar length (Fig. 1, *2*) has a ratio of maximum width to length of about 5.4 : 10.

Shape B. Point 2 from Browns Valley is almost identical in shape to Points 7 and 8 from Milnesand. The point of maximum width on this Browns Valley point falls slightly closer to the base than on the equivalent Milnesand points, where the greatest width is just at or above the halfway point in the length of the blade. Most of the Browns Valley points have the maximum width at the halfway point in the length of the blade.

Shape C. The 2 almost identical Browns Valley Points 3 and 4 find closely similar equivalents in Points 14, 15, and 16 from Milnesand. No 2 point shapes are identical but one might easily fit these Browns Valley shapes into the Milnesand series of longer points without mental reservations.

Shape D. In both Browns Valley and Milnesand are blades in which the curve of one edge is considerably more convex than the other. These may have been skinning knives. Plotting both curves about a line from the mid-point of the base to the tip we derive diagrams such as 5 and 6 from Browns Valley and 9 and 10 from Milnesand. Number 5 from Browns Valley closely imitates Number 9 from Milnesand in the curve of the inflated edges. The narrower curves do not match so well.

Shape E. The curve of the narrow edge of Point 6 from Browns Valley closely approximates the shape of Point 17 from Milnesand.

It is perhaps safe then to suggest that both Browns Valley and Milnesand points stem from a similar tradition if they are not indeed identical. We thus have some solid grounds for suggesting the possibility that both finds are of a similar age. We may also safely suggest that Browns Valley men probably hunted the giant bison which has been found abundantly in Minnesota and that the Milnesand bison hunters may have resembled Browns Valley Man as known from the skeleton found with the Browns Valley points.

JENKS, A. E.

1937a Minnesota's Browns Valley Man and Associated Artifacts. *Memoirs of the American Anthropological Association*, No. 49. Menasha.

1937b Minnesota Kitchen Midden with Fossil Bison. *Science*, Vol. 86, pp. 243-4. Washington.

POWELL, L. H.

1955 Spring Lake Archeology — Point Profiles. *Science Bulletin of The Science Museum of the Saint Paul Institute*, No. 3, Pt. 1. St. Paul.

SELLARDS, E. H.

1955 Fossil Bison and Associated Artifacts from Milnesand, New Mexico. *American Antiquity*, Vol. 20, No. 4, pp. 336-44. Salt Lake City.

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August, 1955

A "GRAVER" SITE IN WISCONSIN

The subject of this report is a group of 70 gravers collected in 1954 and 1955 from the surface of a village site about 12 miles southeast of Madison, Wisconsin. The finding of this number of gravers at a single site is unusual and is also of special interest since gravers have usually been associated with Archaic and earlier horizons. A separate report (Nero 1955) has been published on the total assemblage of artifacts from the site, material which represents a conglomeration of several cultures, though an Archaic-like complex predominates.

The site lies on the farm of Alfred H. Havey and will be referred to as the "Havey Site." It is evidently the site described by McLachlan (1925: 204) as the "Outlet Village Site." The area appears to have been well-known and extensively worked by local collectors. I wish to acknowledge the kindness of Mr. and Mrs. Havey in permitting us to tramp up and down their fields. Thanks are due Richard A. Hunt, Archie Mossman, Dean Amadon, Keith Hamilton, and Warren L. Wittry, all of whom accompanied me at various times to the site to collect material. David A. Baerreis and Warren L. Wittry have contributed much to the paper in the way of advice and encouragement.

The Havey site is situated on a low, nearly north-south ridge about ¼ mile south of the Yahara River outlet on the east side of Lake Kegonsa in Dane county (SW ¼ SE ¼ Sec. 20, T6N, R11E). This ridge joins other larger and higher ridges to the south and is separated from the lake and river by low marshland except on the northeast corner where pastured land runs right down to the edge of the river. The total assemblage of material from the site was found over some 17 acres, but the majority of the gravers were found within an area of about 2 acres.

The Gravers. "Graver" is a term which has been applied to a certain chipped stone implement, the main feature of which is a small, sharp point fashioned on the edge of a flake or flake implement. The pressure chipping which formed the point usually was directed from the flat side of the flake with the result that a graver point is characteristically unworked and flat on one face.

Gravers first received considerable attention when a number of them were found at the Lindenmeier Site in Colorado, forming part of the Folsom complex (Roberts 1935, 1936). These distinctive tools were also found in New Mexico in Sandia Cave (Hibben 1941), and in Texas where they were associated with the Clear Fork complex (Ray 1938). Wright (1940) described and classified a large number of gravers from numerous sites in Texas (see below). Gravers have also been found at paleo-Indian sites in Massachusetts (Byers 1954), Pennsylvania

(Witthoft 1952), and Vermont (Ritchie 1953), and with Archaic cultures in Illinois (MacNeish 1948; Mayer-Oakes 1951), and Louisiana (Hagg and Webb 1953).

The occurrence of gravers in Wisconsin was first reported by Baerreis (1953), who found two of them at a site near Madison on the Yahara River 8 miles northwest of the Havey site. Later a few other gravers were found on the surface of a site 3½ miles northwest of the Havey site, and also on the Yahara River.

The above finds stimulated a close search in 1954 for gravers at the Havey site where several ground-edge lanceolate points and a few graver-like implements had previously been found. The first hunt was immediately rewarding; through further efforts we eventually found 70 clearly recognizable gravers (13 additional ones were found after the preparation of the major portion of the paper). The gravers represent about 10% of the total number of artifacts found at this site by us since 1949. On several occasions we simply gathered up as many flakes as we could and then later washed and carefully examined them. More than 2100 flakes were handled in this manner and several small gravers which we might have overlooked in the field were recognized by this means. Graver points, however, were often very fragile and easily chipped; the recognition of a graver on the site was considered desirable since this permitted more careful handling from the field to the laboratory. Five graver points showed recent breakage, the point of one being nearly obliterated; 15 other graver points showed old fractures.

Gravers from the Havey site appear to resemble gravers found elsewhere (see Fig. 1). Wright's Type 1a or "flake graver" (1940: 32), accurately describes the most common form of graver which has been found at this site. It consists of a graver point worked on a fortuitous flake with scarcely any workmanship exhibited except around the graver point. Frequently a dorsal ridge which tapers out to an edge of the flake has been utilized by chipping out an indentation on each side of this ridge where it tapers out to the edge. This results in a short, sharp point which is triangular in cross section and which is not easily broken. Twenty-one gravers from the Havey site show utilization of a dorsal ridge in the manner described above (Fig. 1 *f*, *g*).

Roberts (1936: 26) points out that the graver points on the simple flake gravers from the Lindenmeier site usually have a slight bevel at the tip as well as along the worked edges on both sides of the point. A similar beveling is present on most of the Havey site gravers.

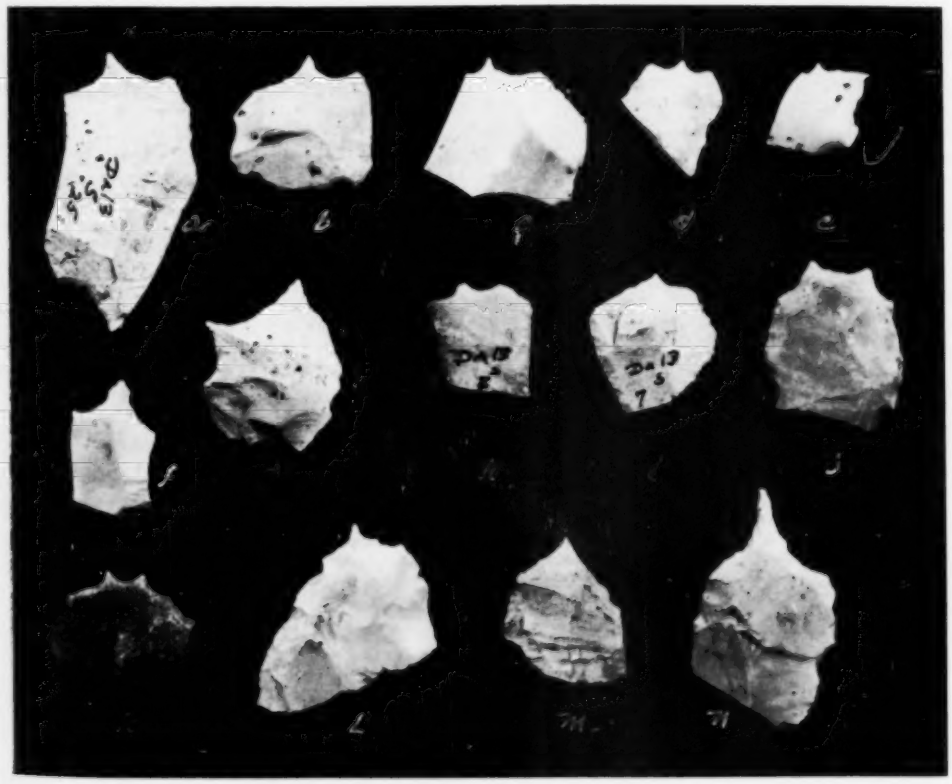

FIG. 1 [Nero]. Typical gravers from the Havey site, Wisconsin (dorsal view; actual size). Photograph by Robert L. Hall.

Wright's Type 1b, the "combination tool" is a flake which has steep chipping along an edge, forming a "scraper," in addition to a graver point. Extra modification of the edge of the flake occurs on 23 of 70 flake gravers from the Havey site, extensively on 12 which can be described as scrapers (Fig. 1 *h-j*). One of these is a large, double concave side-scraper or "spokeshave." In addition to the above, 2 snub-nosed end scrapers from this site each bear a small graver "spur" on one side and appear to resemble similar artifacts from Bull Brook (Byers 1954: 349).

Wright's Type 2, the "chisel graver," is characterized by a broad-tipped point which is straight across the end like a chisel. Roberts previously described similar forms from the Folsom complex material. Both authors found them to be rare. None of this type were found at the present site.

Wright's Type 3 — "graver," is hardly applicable here — is a bifacially worked tool distinguished from a drill or borer by a point ". . . too short to have been of much value in making perforations."

Roberts mentioned the occurrence of flake gravers bearing 1 to 5 points on each flake. Fourteen of these "multiple gravers" were found at the Havey site: 12 with 2 points each, 2 with 3 points, and 1 with 4 points (Fig. 1 *g, j, k*). Seven of these multiple gravers have 2 points in juxtaposition, suggesting a binary function. Parallel lines scratched on paper by these 7 gravers were 5 to 10 mm. apart.

Sixty-three of the Havey site gravers were made by chipping directed from the ventral or bulbar surface of the flake. Only 4 show chipping directed from the dorsal surface. In these 4 the ventral surfaces of the flakes were atypical in that they had an upturned edge due to hinge fracture, so that the dorsal surface presented a flatter base for the graver point (Fig. 1 *e*). One multiple graver had one point chipped from the ventral surface and two chipped from the dorsal surface — again, on an upturned or "reversed" edge. A single graver showed a slight amount of chipping directed from the dorsal surface as well as the usual work from the ventral surface. Although most of the gravers had a more or less level lower surface, two of them had an undersurface which curved upward toward the point.

In 49 gravers from this site (with single points, or multiple gravers with all the points in one group and counted only once) in which the bulbar end of the flake was apparent, 28 had the graver point on the opposite end and only 4 had the point on the bulbar end. The point was located on the side of the flake in 17 others (9 with ends broken off or hinge fracture).

In 52 Havey site gravers the points were formed by the removal of 2 adjacent concave segments, sometimes barely freeing the point from the body of the flake (Fig. 1 *a-e*). The unchipped edges adjacent to the point in the latter gravers often seemed likely to impede utilization of the short point (for example, Fig. 1 *d*). Six graver points were formed by the removal of a concave segment on only one side, the other side of the point having been chipped in a straight line. Twelve others were formed by steep retouching along one or both sides of a naturally formed point or corner on a flake, leaving a graver point in the shape of an acute angle rather than as 2 adjacent arcs (Fig. 1 *l, m*). These latter were usually thicker flakes with more chipping and a cruder point. Three of the 70 gravers described above are made of quartzite, the others are made of various kinds of chert.

There seems to be some relationship, besides frequency of occurrence, between the gravers and several Archaic-like lanceolate points with ground edges near the base which were found at this site. One graver (Fig. 1 *m*) has been chipped from a portion of such a point and still shows the ground edge. Another graver (Fig. 1 *l*), also made from a blade, consists of a kind of chert which is rare at the site; what is evidently the same material was used to make 2 end scrapers each of which has one edge ground. Another similar scraper which also has a ground edge is made from the base of another ground-edge point.

Graver points are usually short compared to typical bifacially chipped "drills." Sixty-one gravers from the Havey site had points which averaged 2.4 mm. in length (measured from a line drawn across the base of the point at the level of the nearest unchipped edge or "shoulder" on either side at the point and perpendicular to a line bisecting the point; see Table 1). Two other gravers each had a point 10 mm. long (Fig. 1 *n*) and one exceptionally large graver had a point which measured 17 mm. even though the tip was broken. According to Roberts (1936: 26) Folsom flake gravers had points which were consistently 1.5 to 2 mm. in length. The longest graver point measured by Wright (1940: 39) was about 16 mm. (⅝ inch) long.

TABLE 1. MEASUREMENTS OF TYPICAL HAVEY SITE GRAVERS (in mm.)

Dimension	Number of Measurements	Ave.	Min.	Max.
Graver point length	77 (on 61 flakes)	2.4	0.2	6
Graver length	79 (on 63 flakes)	24.7	13	50
Graver width	77 (on 63 flakes)	23.6	12	61
Graver thickness	61 (on 61 flakes)	4.8	2	8.7

The length of a graver (the whole flake) was taken as the maximum dimension, including the point, parallel to a line bisecting the point. Width was taken as the maximum dimension of the flake parallel to a line perpendicular to the line bisecting the point. Each point on a multiple graver yielded a separate set of measurements. The average length of 63 Havey site gravers was 24.7 mm., the average width 23.6 mm. The smallest single flake was 14 by 14 mm., the largest 43 by 61 mm. Six other gravers consisting of atypical flakes or large "chunks" of chert, ranged in length from 38 to 76 mm., and in width from 28 to 62 mm.

Thickness of the flake was taken as a maximum measurement. Out of a total of 70 flake gravers 61 were less than 9 mm. thick (average 4.8 mm.). Nine others were more than 9 mm. thick (9.2 to 15.5; average 11.6 mm).

Folsom gravers were of somewhat comparable size, ranging from 19 to 55 mm. in length, 13 to 33 mm. in width, and 3 to 6 mm. in thickness (Roberts 1936: 26).

Experiments Relating to the Manufacture and Function of Gravers. Gravers have been generally supposed to function as engraving or incising tools. Roberts (1935: 26) found small, almost microscopic flakes broken away from the points of some gravers in a way suggesting that the graver had been used in a scratching or gouging movement rather than a rotary twist. Many of the graver points from the Havey site also show similar small flake scars. These scars are especially noticeable on the ventral flat surface of the points and usually are directed parallel to their length which suggests that the graver was used in a gouging movement. I was unable to find any signs of polishing, such as might result from usage wear, on these gravers. In a later paper, following further excavations at the Lindenmeier site in which a fragment of bone bearing incised lines was discovered, Roberts stated (1936: 25): ". . . gravers . . . suggest that the makers of the Folsom points were also adept at some form of the engraver's art." Ray (1938: 200) pointed out that an engraved bone tube was found in a grave assigned to the Clear Fork complex, which includes gravers.

Owing mainly to a personal skepticism in regard to the use of thin flake gravers as tools for incising bone or shell, the writer "manufactured" some 5 dozen "gravers" and subjected these to a few tests. Waste flakes of chert of several varieties and quartzite from the Havey site were utilized for this purpose, graver points being produced by unifacial pressure flaking with an antler tip. The 2100 flakes from which the flakes for making gravers were selected were not all found to be suitable. Consider-

able selection was necessary in order to obtain flakes which would allow production of gravers reasonably similar to those from the Havey site. This suggests that some selection of flakes might have been made by the early artificers. After a little practice reproductions were easily fashioned in a few seconds time, and in most respects these closely resembled the original gravers. With thin flakes it was often only necessary to press the antler tip once against the edge in 2 adjacent places in order to completely form a point. As a result of the application of the rounded surface of the antler tip to the edge of the flake, a concave edge was formed on each side of the point. Many of the original gravers show a similar form.

"Undercutting" or horizontal fracturing of the flake scars near the ventral edge of the chipped area, a condition somewhat resembling usage wear, occurred naturally as a result of pressure flaking. A similar condition was observed on most of the Havey site gravers. Beveling of the chipped edges as well as of the graver point itself occurred in all the reproductions as a natural concomitant of the steep and adjacent pressure flaking required to shape the point. Beveling of all the graver points resulted, regardless of whether or not they were formed on a tapering dorsal ridge, although the use of the latter heightened the effect. Unifacial pressure flaking was found to be a better controlled method for shaping a sharp point than bifacial flaking. Very sharp points were quickly produced in this manner.

The location of a graver point with respect to the bulbar end of a flake seems to be a consequence of the natural form of a flake. Ordinarily the bulbar end is thicker and is blunt; the opposite end and the sides usually taper to a thin edge. This selectivity was also apparent in the experimental manufacture of 24 gravers which were made as rapidly as possible without attempting to recognize the bulbar end of the flake: On 13 flakes the points were shaped on the edge opposite the bulbar end; the points were made on the side of the flake on the other 11. In all but 2 of the latter flakes the end opposite the bulbar end was rounded or blunted due to hinge fracture, or was broken, thus prohibiting the use of this end.

The graver reproductions mentioned above were tested for the functional capacity of engraving by attempting to incise lines with them on wood, bone, and shell. One fact which was clearly established was that the use of a graver in a "scratching" motion, that is, a pulling or backward movement with the flake held at a right angle to the direction of motion (and the ventral surface downward) caused immediate fracturing of the graver tip. This happened with nearly every graver applied in this manner to bone, shell, and wood, and even to some which were applied to relatively soft leather. Large gravers with heavier tips proved more sturdy than the thinner ones, of course, but the tests were mainly concerned with the capacities of thin flake gravers.

A more efficient utilization of a graver was obtained by using it in a "gouging" fashion, that is, by a forward, pushing movement, with the flake held in the same manner described above, in the way in which an ordinary chisel is employed. Incised lines were cut with these test gravers on fresh deer bone, swan bone, clam shell, and wood by means of this method. However, some care was necessitated since the least downward pressure fractured the point tip. For maximum proficiency in gouging the flake had to be held, as must a chisel, at a low angle to the surface being worked. This required that the flake be grasped mainly by the edges rather than by the 2 faces, and for good control the flake had to be held rather tightly. The naturally sharp edges of most of the flakes proved rather irritating to the thin- fingered author under these circumstances. Many of the Havey site gravers, when held in a similar manner, presented the same difficulty. It seems incredible that gravers would have been used in some manner as described above without first at least blunting the sharp edges of the flake, an operation requiring the merest touch of the flaking tool. Gravers with thicker points were used on wood in a direction parallel to the grain with excellent results. It was found that a neat longitudinal incision could be cut by holding the graver perpendicular to the surface of the wood and with the surface at right angles to the direction of movement while drawing it back and forth along a line. The short graver points, of course, limited the depth of the incisions to 1 to 2 mm. (Perhaps a just criticism of the above tests was the use of "old" weathered chert flakes. Later tests of gravers made from freshly quarried chert from a Madison limestone quarry, however, yielded similar results.)

Obviously, gravers of different sizes could have served in different capacities, heavier ones evidently being suitable for incising lines on bone and other materials, if used in a gouging fashion. In my opinion, however, it seems unlikely that the typical light gravers from the Havey site were manufactured for this purpose. Gravers could have been used in a variety of ways unrelated to "engraving." They could certainly have been used in a piercing operation, possibly in tatooing, as Roberts suggested (1936: 25). Tests for this function were also made and with convincing results. The sharp points readily pierced the skin on the back of a hand and the impeding adjacent shoulders kept the points from penetrating very deeply. As an exercise in imagination we might suggest a few other possible uses: separation of vegetable fibers, removal of thorns from the flesh, sewing, and carving the eye in a bone needle.

It seems to me that the majority of the Havey site gravers must have been made rapidly and were to be used only temporarily. The relatively high frequency of their occurrence at this site suggests an important utilitarian function related in some way to camp life. The presumed expendability of these gravers suggests that this might have been a practical use requiring a graver only momentarily (though frequently) or possibly a ceremonial function in connection with medicinal or other practices.

BAERREIS, D. A.

1953 The Airport Village Site, Dane County (Da2). *The Wisconsin Archeologist*, Vol. 34, No. 3, pp. 149-64. Milwaukee.

BYERS, D. S.

1954 Bull Brook — A Fluted Point Site in Ipswich, Massachusetts. *American Antiquity*, Vol. 19, No. 4, pp. 343-51. Salt Lake City.

HAAG, W. G. AND C. H. WEBB

1953 Microblades at Poverty Point Sites. *American Antiquity*, Vol. 18, No. 3, pp. 245-8. Salt Lake City.

HIBBEN, F. C.

1941 Evidences of Early Occupation in Sandia Cave, New Mexico, and Other Sites in the Sandia-Manzano Region. *Smithsonian Miscellaneous Collections*, Vol. 99, No. 23. Washington.

MCLACHLAN, W. G.

1925 The Lake Kegonsa Region. *The Wisconsin Archeologist*, Vol. 4, No. 4, pp. 181-206. Milwaukee.

MACNEISH, R. S.

1948 The Pre-Pottery Faulkner Site of Southern Illinois. *American Antiquity*, Vol. 13, No. 3, pp. 232-42. Menasha.

MAYER-OAKES, W. J.

1951 Starved Rock Archaic, a Pre-pottery Horizon from Northern Illinois. *American Antiquity*, Vol. 16, No. 4, pp. 313-24. Salt Lake City.

NERO, R. W.

1955 Surface Indications of a Possible Early Archaic Camp-Site in Wisconsin. *Wisconsin Archeologist*, Vol. 36, No. 4, pp. 128-46. Milwaukee.

RAY, C. N.

1938 The Clear Fork Culture Complex. *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 10, pp. 193-207. Abilene.

RITCHIE, W. A.

1953 A Probable Paleo-Indian Site in Vermont. *American Antiquity*, Vol. 18, No. 3, pp. 249-58. Salt Lake City.

ROBERTS, F. H. H., JR.

1935 A Folsom Complex: Preliminary Report on Investigations at the Lindenmeier Site in Northern Colorado. *Smithsonian Miscellaneous Collections*, Vol. 94, No. 4. Washington.

1936 Additional Information on the Folsom Complex: Report on the Second Season's Investigations at the Lindenmeier Site in Northern Colorado. *Smithsonian Miscellaneous Collections*, Vol. 95, No. 10. Washington.

WITTHOFT, JOHN

1952 A Paleo-Indian Site in Eastern Pennsylvania: An Early Hunting Culture. *Proceedings of the American Philosophical Society*, Vol. 96, No. 4, pp. 464-95. Philadelphia.

WRIGHT, W.

1940 The Type, Distribution and Occurrence of Flint Gravers in Texas. *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 12, pp. 31-49. Abilene.

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May, 1955

THE SOUTHWESTERN FRONTIER OF ESKIMO CULTURE

In a recent summary of our knowledge of Eskimo archaeology in Siberia (Chard 1955b) the present writer cited a reference to the existence of remains of underground houses on the west side of Anadyr Gulf, and inferred from this a possible extension of prehistoric Eskimo culture in this area considerably to the west of its presently known range. One of these rumored sites has now been investigated, with highly interesting results (Okladnikov and Naryshkin 1955). The culture revealed was not the classic Eskimo found at all other coastal sites around the Chukchi Peninsula, but instead is a blend of Eskimo with a distinctly different complex whose affinities lie far to the south on the shores of the Okhotsk Sea. A. P. Okladnikov, the leading Soviet authority on Siberian archaeology, views the site as representing a new and independent culture which cannot be classified wholly with either, although its roots run in both directions. This suggests that the southwestern limit of the classic Eskimo culture in prehistoric times lay somewhere on the north side of Anadyr Gulf between Enmylen (Cape Bering) and the mouth of the Anadyr River, although its influences penetrated still further. Such a limited occupation of the southern shores of the Chukchi Peninsula is in marked contrast to the picture on the arctic coast, where typically Eskimo sites extend west to the Kolyma River.

Aside from thus defining the probable limit of Eskimo territory, the site is of interest in its own right, representing as it does the first information from a key area that has hitherto been a blank spot on the archaeological map. In addition, we are enabled to learn indirectly something more definite about the prehistoric culture unearthed by Okladnikov's 1946 excavations in the Magadan area on the north shore of the Okhotsk Sea — on which almost nothing has yet appeared in print — since the stone artifacts from the newly discovered site are stated to be very reminiscent of comparable types from Magadan. For this reason it was deemed worthwhile to reproduce here all the illustrations of stone specimens.

The new site is at the mouth of the Kanchalan River, which empties into the estuary of the Anadyr. It consists of the remains of 2 small adjoining settlements, one of 5 underground houses, the other of 7, each aligned in a single row. The site is advantageously located from the viewpoint of fish runs and reindeer migrations, and the evidence suggests that these may have furnished the main subsistence. Bone remains were almost entirely of reindeer; there was only a single seal bone, and no toggle harpoons (the "type artifact" on Eskimo sites), although one prong of a fish spear was recovered. It should be noted in this connection, however, that several of the artifacts were made of walrus ivory.

The house remains were circular pits 3 to 6.5 m. in diameter and 0.5 to 1.0 m. deep, surrounded by an earth wall up to 20 or 30 cm. high and 50 cm. thick. A break in this wall indicated the location of the exit (maximum width 70 cm.) which faced south, away from the water. One of these house pits was dug in 1953 by V. V. Narysh-

kin, Director of the Chukotsk Regional Studies Museum at Anadyr, revealing a central hearth surrounded by stones at a depth of 12 to 13 cm. Bone refuse, potsherds, and artifacts of bone and stone were recovered.

Two pottery wares were represented: one crude, thick (average 1 cm.), gravel tempered, poorly fired, undecorated, sometimes with external lugs; vessels had a top diameter of 18 to 25 cm., and a height of 19 to 22 cm. The other ware was finer, thinner (5 to 6 mm.), tempered with very fine sand, the surface showing evidence of treatment with a corrugated paddle. Both wares appear to have had round bottoms. Although pottery with analogous features occurs in the Eskimo sites on the Chukchi Peninsula, I would point out that vessels with external lugs are confined to the late sites, while use of a corrugated paddle occurs only on the earliest ones; the 2 traits are never found coexisting as at Kanchalan.

The bone artifacts can also be duplicated on Eskimo sites: picks, hammer of walrus ivory, and the fish-spear prong of the same material.

When we turn to the stone artifacts, however, an entirely different picture presents itself. They have no such close parallels in the local Eskimo sites, but instead, as mentioned, recall the comparable tools unearthed at Magadan, nearly a thousand miles to the southwest. (Okladnikov views the Magadan sites as possibly representing the ancestors of the Koryak.) All of the 16 stone artifacts recovered are scrapers, made of obsidian and volcanic tuff. In length they ranged from 3.6 to 8.2 cm., in thickness, 1 to 1.5 cm., sometimes up to 2 cm. The eight which were illustrated are shown in Figure 1.

It is of interest that the cultural remains at Kanchalan show no connection with the sites in the interior of the Chukchi Peninsula, not far distant (see Chard 1955a). The affinities of the latter lie with interior Siberia — a totally different cultural tradition — whereas Kanchalan seems to represent a maritime world the links of which ran exclusively along the coast of Asia, apparently for great distances.

There is no basis at present for dating the Kanchalan site, although Okladnikov feels certain that it falls within the Christian era.

In concluding, I should point out that only one house at this site was tested, and that further excavation might alter the cultural picture to some degree, especially its negative aspects.

CHARD, C. S.

1955a An Early Pottery Site in the Chukchi Peninsula. *American Antiquity*, Vol. 20, No. 3, pp. 283-84. Salt Lake City.

1955b Eskimo Archaeology in Siberia. *Southwestern Journal of Anthropology*, Vol. 11, No. 2, pp. 150-77. Albuquerque.

OKLADNIKOV, A. P. AND V. V. NARYSHKIN

1955 Novye Dannye o Drevnikh Kul'turakh na Chukotskom Poluostrove (New Data on the Ancient Cultures of the Chukchi Peninsula). *Sovetskaia Etnografiia*, 1955, No. 1, pp. 151-8. Moscow.

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October, 1955

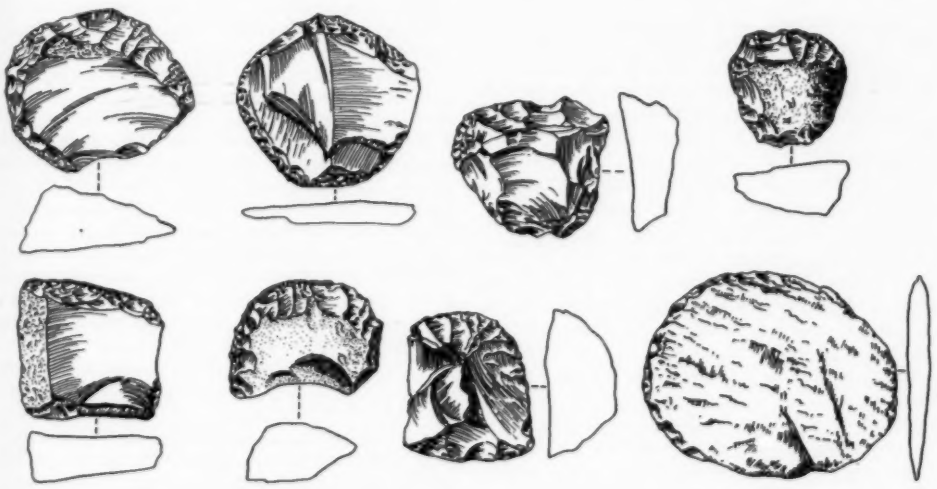

FIG. 1 [Chard]. Stone artifacts from the Kanchalan site on Anadyr Gulf, eastern Siberia (after Okladnikov and Naryshkin 1955).

REVIEWS

EDITED BY RAYMOND H. THOMPSON

Current Anthropology. A Supplement to Anthropology Today. Edited by WILLIAM L. THOMAS, JR. University of Chicago Press, Chicago, 1956. xii + 377 pp. $3.50 paper, $5.00 cloth.

Current Anthropology is a republication of essays contained in the first 3 parts of the *Yearbook of Anthropology — 1955* (836 pp.) which received a limited distribution. Both volumes have been sponsored by the Wenner-Gren Foundation for Anthropological Research, and are designed to supplement the encyclopedic inventory of anthropology inaugurated with the publication in 1953 of *Anthropology Today*. The purpose of the Wenner-Gren program has been to appraise and summarize anthropological activities, methods, theoretical views, and problems on a world-wide scale.

The scope of the undertaking can be to some degree appreciated by considering the quantitative results to date. The 18 essays in *Current Anthropology* comprise the following: *Part One*: Guest Editorial, by Julian S. Huxley; *Part Two*: Essays by Paul B. Sears, Adolph H. Schultz, Loren C. Eisely, Lauriston Ward, Gordon F. Ekholm, Emil W. Haury, James B. Griffin, Christoph von Fürer-Haimendorf, and Wilhelm Koppers; *Part Three*: Essays by Edward P. Dozier, David G. Mandelbaum, W. W. Howells, Raymond Firth, Oscar Lewis, A. L. Kroeber, Sol Tax, and John W. Bennett and Kurt H. Wolff. The selected references, totaling some 75 pages, list with scarcely any duplication, about 1300 books and articles. At least half of these have been published in the years 1953-55, and almost all the remainder since 1950. The index of 22 pages is exemplary. The *Reference* portion of The Wenner-Gren *Yearbook* promises to be most useful, listing doctoral degrees (with dissertation), medals and awards, and anthropological societies.

The essays in *Current Anthropology* bring the Wenner-Gren inventory to a total of more than 1700 pages of analysis and evaluation by seasoned contributors engaged in exploring content and purposes and in making judicious appraisals of divergent or controversial methods and interpretations. When we contemplate the overwhelming quantity of anthropological contributions published in a variety of languages throughout the world, we have good reason to be grateful for these summaries and appraisals published in a standard and readily available series.

The essays in this volume are in essence comprehensive commentaries, and as such they cannot be adequately treated in a conventional review. This volume will be read and evaluated by several hundred anthropologists, each of them encountering matters that merit special comment in particular geographical or theoretical provinces. Here I shall limit myself to general impressions, in keeping with the scope and intentions of the volume as stated by the editor in his introductory pages.

The Wenner-Gren series of appraisals published during the initial 4-year period seems to be sufficient to guide the directors of the program in preparing subsequent Yearbooks. They have doubtless considered all the obvious suggestions that might be offered for improvement or modification. Presumably, with a leveling off to shorter annual volumes some repetition and overlapping of content may be avoided. Some of the contributors remark on the difficulty of encompassing a hemisphere in a few pages of text, and it might be well to publish summaries of pertinent subjects at greater length but at less frequent intervals. Currents of theory run deep and change slowly beneath the restless surface waters of anthropology, so that appraisals made at intervals of 2 or 3 years might minimize repetition and allow more time to include significant changes and advances in knowledge, method, and approach.

The status of anthropology as a profession will doubtless always be a continuing and necessary concern, but as the contents of the essays demonstrate, there is no occasion for uncertainty about the value of its subject matter or its contributions to knowledge. In dealing with the purposes of anthropology, the essays in this volume exhibit a prevailing spirit of restraint and judicious evaluation, noticeably more mature than some of the contentious critiques that appeared a decade or so ago. The present lack of a rigidly formalized discipline for the study of anthropology is more gratifying than deplorable. As the essays in *Current Anthropology* clearly show, the profession is well safeguarded against "premature crystallization of spurious orthodoxies."

Considered together the appraisals thus far published indicate a recognizable shift of emphasis in anthropological thought during the past 5 or 6 years; namely, a renewal of interest in historical depth. I do not mean only the rapid development in methods of establishing chronologies, but a philosophical contemplation of the vast silent corridors of time. Even the most contemporary-minded anthropologists continue to wonder and speculate about the circumstances that induced man's earliest ancestors to come down out of the trees to forage in a 2-dimensional world. Did they have brains? Or, like ourselves, did they simply crawl out on a limb and chop it off with a *coup de poing?*

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Program of the History of America. Indigenous Period. (Coordinator: JUAN COMAS.) Comisión de Historia, Instituto Panamericano de Geografía e Historia, Mexico.

1. *Origins* by HANNAH M. WORMINGTON. Publ. 153, 1953. 110 pp.
2. *Arctic Area* by HENRY B. COLLINS. Publ. 160, 1954. 152 pp.
3. *United States and Canada* by JAMES B. GRIFFIN. Publ. 154, 1953. 104 pp.

4. *Mesoamérica* by IGNACIO BERNAL. Publ. 152, 1953. 106 pp.
5. *Zona Circuncaribe* by MIGUEL ACOSTA SAIGNES. Publ. 162, 1953. 101 pp.
6. *Colombia* by GERARDO REICHEL-DOLMATOFF. Publ. 151, 1953. 54 pp.

4 y 6. *Mesoamérica y Colombia (Suplementos)* by I. BERNAL AND G. REICHEL-DOLMATOFF. Publ. 158, 1953. 53 p.

7. *Guianas* by IRVING ROUSE. Publ. 157, 1953. 100 pp.
8. *Brasil* by EMILIO WILLEMS. Publ. 169, 1953. 110 pp.
9. *Altiplano Andino* by LUIS E. VALCÁRCEL. Publ. 156, 1953. 141 pp.
10. *Región Meridional de América del Sur* by FERNANDO MÁRQUEZ MIRANDA. Publ. 178, 1954. 240 pp.

At the second meeting of the planning board of the Commission of History of the Pan American Institute of Geography and History in 1950, the proposal was approved that the Commission sponsor the writing of a "Program of History of the Americas." A series of organizational meetings were held and, with the aid of the Rockefeller Foundation, the project was launched. The history was divided into 3 major sections, with a coordinator appointed for each section: *Indigenous Period* — Juan Comas; *Colonial Period* — Silvio Zavala; *National Period* — Charles C. Griffin. Manuscripts covering the Indigenous Period were so near completion by 1953 when the Commission of History met in Havana, Cuba, under the auspices of the Comité del Centenario del Nacimiento de José Martí, that it was decided to issue them as part of the commemoration activities. Consequently, nine of the 11 publications composing this section appeared with a 1953 publication date.

Although the planning committee furnished a general outline to the coordinator and the various contributors met together to discuss the organization of the reports at an early stage of the planning, no rigid rules and regulations were enforced. As a result, each of the 11 volumes differs in emphasis, coverage, and orientation. Some of these differences are due to the particular interests of the writer; others reflect the unevenness of the available published data; others result from varied interpretations of how the planning committee's suggestions were to be followed. Although the "themes" or "topics" vary in scope from book to book, the one consistent point of organization is the use of this frame of reference.

In April, 1956, the Commission of History held a 3-day conference in Washington, to evaluate the entire program of the writing of the History of the Americas in all 3 periods and to discuss the reports submitted in each section into a single volume for each of the major periods — Indigenous, Colonial, and National. Pedro Armillas was given the task of summarizing the Indigenous Period from the 11 preliminary publications being reviewed here, and the manuscript is now in press. The general feeling of the delegates to the conference was that: (1) No single book could ever draw together and do justice to all the contributions originally presented in the separate sections. (2) At best the History of the Americas project can furnish a series of "themes or topics or ideas," which a future scholar might use as a guide in any specific line of research. (3) The original contributions left much to be desired in consistency and perhaps should have been oriented more strictly to a consistent plan and outline. (4) In spite of any shortcomings, the possibility of achieving a comprehensive "History of the Americas" was brought closer to realization as a result of the project. As delegates to this conference and now as reviewers of one section of the published reports, we concur with these viewpoints. Considered as a whole, the results are highly worthwhile. One of the most significant aspects of the project is the emphasis given to the *Indigenous Period*, which exceeds both the *Colonial Period* and *National Period* in number of publications as well as total bulk. This background to European colonization is ignored or glossed over in volumes on American history, and the Program of the History of America has helped to acquaint historians with its importance. Unfortunately, the indoctrination was not complete and even at the Washington meeting, one historian argued strongly against inclusion of the Indian background on the grounds that ir was no more significant to the history of the Americas than the aboriginal antecedents of the Negro, Oriental, or European elements of the present population. Regardless of the merits or shortcomings of the individual contributions, this recognition of American history as beginning with the peopling of the Americas rather than with the arrival of the Europeans makes the Commission of History's project a unique contribution, and one that all anthropologists will applaud.

The 11 volumes summarizing the Indigenous Period are generally successful in fulfilling the aims of the planning committee: (1) to provide an historical outline; (2) to suggest avenues of investigation; (3) to serve as a basis for classroom instruction to be supplemented with library research. They do not provide detailed discussion of areas, cultures, or sequences, but the topical organization and bibliographic listings make the booklets handy for reference and for gaining an impression of the present status of our knowledge and major areas of ignorance. Three languages are employed in the series, each publication being printed in the national language of the author. Consequently, six are in Spanish, four in English, and one in Portuguese. The remainder of this review will consider the special characteristics of the individual volumes.

Following the established pattern of organization according to major themes, Wormington divided her report on Origins into a discussion of the Pleistocene and Neothermal Periods, Methods of Dating, Times and Routes of Migrations, Some Discoveries of Artifacts Which Indicate the Antiquity of Man in the New World, Some Human Physical Remains of Presumed Antiquity, and Theories Regarding the Peopling of the Americas. On a controversial subject, where speculations have run rampant for decades, Wormington has given an unprejudiced summary of the facts and the theories, emphasizing the need for further additional data and new methodological

approaches. A good, but by no means complete, bibliography with each theme provides basic references for the scholar who wishes to pursue the subject in greater detail.

Collins divides his report on the Arctic into 5 general sections containing a total of 41 themes or subtopics which present a summary statement of our present knowledge of the area. His major sections include a comprehensive coverage of both the archaeology and ethnology. Some of the extensive bibliography is annotated, which is most helpful. Since this volume has already been reviewed separately, no other comments are necessary here (Laughlin, 1955, *Amer. Antiq.*, Vol. 21, No. 2, pp. 189-90).

In the *United States and Canada*, Griffin covers both archaeology and ethnology, with mention of linguistic stocks. Because he conformed strictly to the idea that the themes were to provide a broad outline that could be followed in writing a detailed study of the indigenous history of each area, Griffin's report is largely a listing of cultures, tribes, and traits with little to connect them. He has outlined the characteristics of the area from the time of the paleo-Indian to the modern tribes, with a bibliography of basic references where the descriptive information can be found. The last chapter, "Interaction Between Indians and Europeans in the Early Historic Period," will be the most disappointing to anthropologists for no bibliography is given and only the barest outline of how to approach the subject is provided, apparently because Griffin felt that this section would be developed in greater detail in the Colonial Period of the series. Unfortunately that author approaches the subject from a purely historical rather than from an anthropological standpoint. A nonspecialist required to give a general course on the archaeology and ethnology of the United States and Canada would find Griffin's outline style of presentation useful (provided he was willing to search out the literature and fill in the details) in drawing up a course which was supposed to touch the highlights of an area and yet offer enough detail to give some appreciation of the complexity of the problems.

Ignacio Bernal deals with Mesoamerica in an even more outline style than Griffin's with 11 main chapters and a total of 126 themes. Often his themes are nothing more than a statement of a problem without even listing a bibliography; however, where he does list bibliography, it is fairly complete and helpful. Probably nonanthropologists will have difficulty using this volume for often the themes are stated briefly in highly technical ethnological or archaeological terminology. Considering the complexity of the area and the absence of any single book to date that draws things together in any generalized manner whatsoever, Bernal's contribution is a step forward. The next step will be to take his outline and expand it into a Handbook for Mesoamerican Anthropology. In short, Bernal's outline of themes and bibliographic references has very effectively started the job for someone else to complete.

Although the title of Acosta Saignes' report is *Zona Circuncaribe*, his emphasis is so strongly on the ethnology of Venezuela, with only the lightest treatment of Colombia, the Antilles, and the countries of Middle America, that his study cannot be considered a good outline of the Circumcaribbean area as defined by Steward in Volume 4 of the *Handbook of South American Indians*. Also, Acosta Saignes almost completely ignores archaeology in spite of the considerable amount of work that has been done. His account is primarily a detailed listing of tribes with an annotated bibliography of each group, the whole arranged according to 49 themes, which are largely tribal names (Caribes, Lenca, Cuna, Choco, and so on). Pages 87 to 101 are a supplement by Reichel-Dolmatoff outlining with bibliography the archaeology of that part of Colombia that forms part of the Circumcaribbean region.

Although shorter than some of the other volumes, Reichel-Dolmatoff's *Colombia* strikes the reviewers as a very useful guide and a thorough outline to the study of the indigenous period of this area. He gives data on both ethnology and archaeology, with a slightly greater emphasis on the latter. In an introductory chapter he clearly explains the organization of his report, and the meaning of the themes. Under each theme he has a commentary, followed by a bibliography with detailed annotation. Both Bernal and Reichel-Dolmatoff apparently had afterthoughts not ready for the original publications. These are presented in *Suplementos — Mesoamérica y Colombia*. The scholar should consider this supplement as nothing more than additional themes belonging to Numbers 4 and 6.

Rouse's presentation of the archaeological and ethnographic picture in the Guianas is organized around a chronological framework of 6 periods: Preceramic, Early Ceramic, Middle Ceramic, Late Ceramic, Early Historic, and Late Historic. After discussing the archaeological complexes on the Orinoco and the Amazon, the discovery and colonization of the Guianas, and the surviving aboriginal tribes, Rouse attempts a reconstruction of Guiana history. He characterizes the area by 3 features: plurality of culture, mobility of tribes, and cultural backwardness. As a result of these efforts to reconstruct and interpret the cultural development, Rouse has achieved a more original contribution than most of the other authors attempted. A well annotated bibliography adds to its value as a reference.

Willems' treatment of Brazil, by contrast, is limited to a descriptive summary, with no attempt at historical reconstruction or interpretation. Following a brief discussion of major archaeological remains (sambaquis, Lagoa Santa caves, lower Amazon sites), Willems organizes the ethnographic data in terms of Murdock's culture area classification. In so doing, he expresses a doubt that future work will justify retention of the Juruá-Purús area as an independent unit. The bibliography is not as well selected as it might have been. For example, Palmatary's major report on Marajoara ceramics is omitted.

Valcárcel's *Altiplano Andino* is an excellent classificatory and interpretative handling of a complex area with an extensive literature. Unlike the other authors, who cite references for each theme or chapter, Valcárcel placed his bibliography at the end of the report, number-

ing each title, and grouping them according to categories such as "Archaeology," "Inca Empire," "Chroniclers." At the end of each theme, discussion, and chapter, the bibliographic references are given by numerical listing of the titles. For this report his system works extremely well and it should be noted that his bibliography is well chosen (320 titles) and contains the best references on the various subjects. The reviewers feel that this book is one of the most outstanding contributions in the series because Valcárcel did not just take the sequence of obscure archaeological periods and place them in a chronological sequence ending with the conquest of the Inca Empire by the Spanish. Instead he tried to explain and interpret cultural development in ancient Peru. His method is illustrated by citing some of the major chapters headings with their subordinate themes. Chapter 1, Ancient Peru: Its Identification; . . . Chapter 4, Man, Population, Ecology: Theme 7 — Man reconstructed from physical anthropological evidence; Theme 8 — Demographic distribution, historic, estimated for Inca Empire; Theme 9 — Man in relation to his faunal and floral environment; Chapter 5, Theme 17 — Establishment of culture periods and the reasons for doing it; Chapter 7, Basic Cultures and Styles; Chapter 8, Subcultures and Styles; Chapter 9, The Ancient Culture: Theme 26 — Language; Theme 27 — Economics; Theme 28 — Politics, and so on; Chapter 10, The Inca Empire and its Interruption by the Spanish; Chapter 11, The Indian after the Spanish Conquest; and Chapter 12, Major Problems Confronting the Historian in the Study of the Ancient Cultures of Peru. The nonspecialist in Andean culture history will find Valcárcel's book an excellent introduction to a study of the area; the specialist should find it a helpful outline to follow if required to offer a concentrated, generalized history of ancient Peru either for exhibit purposes in a museum, for lectures to a lay audience, or for the organization of a general course at the university level.

Márquez Miranda in *Región Meridional de América del Sur* stressed both archaeology and ethnology in order to give the total picture of the indigenous cultures of Argentina, Chile, and Uruguay. In contrast to the other volumes in this series, Márquez Miranda wrote out his discussions in more complete essay form, developing most of his themes into longer compositions. As a result, his report is not only the longest, but often the most detailed. The bibliography is extensive, often with helpful critical comments about certain references.

In summary, from the standpoint of approach and coverage, the 11 reports can be classified into several categories. Griffin, Bernal, and Acosta Saignes present what are essentially listings of data in outline form; Wormington and Collins provide summary statements of the present status of knowledge; Reichel-Dolmatoff, Bernal, and Valcárcel stress the archaeological data, while Acosta Saignes and Willems place most emphasis on the ethnological data; Valcárcel and Rouse used the techniques of classification and interpretation in the attempt to understand and explain cultural development. If these differences are taken into consideration, each report can provide a useful introduction either to the general area or to that particular aspect it describes most completely.

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The ISCC-NBS Method of Designating Colors and a Dictionary of Color Names. Kenneth L. Kelley and Deane B. Judd. National Bureau of Standards, Department of Commerce, Washington, 1955. v + 158 pp., 12 figs. $2.00.

The archaeologist desiring to use standard color designations falls heir to the results of a tremendous amount of research which has been stimulated by the demands of many branches of science and industry. The volume here reviewed is one of the many products of this research. It is a definitive work, an esesential reference for anyone concerned with color names. It is not, however, a work that will be used extensively in archaeology where the need is primarily for a satisfactory standard and exact designations. Fortunately archaeologists need not trouble their minds with the plethora of color names that have been coined to tantalize, delight, and confuse us. The literature on color, however, may seem bewildering because it is both technical and voluminous. For this reason I would like to call attention to a few particularly pertinent articles.

First I would emphasize that there is no longer any question regarding the most satisfactory color chart for archaeological purposes. For describing color as we see it, a visually equispaced color scale is by far the most useful. The Munsell system, which is the outstanding example of such a scale, has the advantage of extreme accuracy in spacing and a high degree of standardization because of extensive research that has been carried on in the laboratories of the Munsell Company, the National Bureau of Standards, and the Department of Agriculture. It has been published in various editions, the most useful for archaeologists being the Munsell Soil Color Charts, which cover the range of red to yellow of unglazed pottery.

In order to use a color standard with confidence, the principles of color arrangement and designation should be clearly understood. The 3 outstanding books on color science (Ralph Evans, 1948, *An Introduction to Color;* Deane B. Judd, 1952, *Color in Business, and Science, and Industry;* and Comm. on Colorimetry, Optical Soc. of Am., 1953, *The Science of Color*) are all technical, although they contain many pertinent chapters. From the extensive literature that has appeared in scientific and technical journals, a short paper by Nickerson (1948, *Color and Its Description, Bull. of the Am. Ceramic Soc.,* Vol. 27, pp. 47-55) is singled out because of its clear, concise discussion of the rationale of the Munsell system and because it was addressed to ceramists. Attention is also called to the reprint of the original paper by A. H. Munsell (1954, *A Color Notation,* Munsell Color Co.). Munsell, an artist and art teacher, experimented exten-

sively in order to clarify color relations for his students. His paper, first published in 1905, has more than historical interest because of the lucidity of his exposition. Although single copies of this edition are not available for general sale, it can be purchased in group lots for student use.

The ISCC-NBS Method of Designating Colors and a Dictionary of Color Names is, as the title indicates, primarily a dictionary. The brief text includes an historical note, an explanation of the color solid, and procedures for matching various classes of materials. This is followed by a series of charts giving the Munsell boundaries for the named color ranges or blocks of the ISCC-NBS system, a simple, clear nomenclature designed to meet the need for a common color language. Work on this problem was initiated by a committee of the Inter-Society Color Council in 1932. There is also a section of many thousands of synonymous and near synonymous color names grouped under their ISCC-NBS designations. The dictionary proper is an alphabetic list of all the names studied followed by their ISCC-NBS equivalents and a key letter denoting their field of application. These sections enable one to gain an understanding of what color a name refers to without reference to the sample.

Consideration of the relative merits of names and symbols for color designation will indicate why this work is not deemed important to the archaeologist using a color standard. Granted a name has an appeal which a symbol lacks, one does not have to thumb far through the color dictionary to find names that have no self-evident connotation (for example, Samurai, Kremlin, Giallolino). Users of the Ridgway system realize that when an author is hard pressed to find a name for every chip, he may occasionally introduce ones that are more fantastic than descriptive. In contrast, the ISCC-NBS system of color designation was adopted and fully tested with regard to common usage. The familiar, well-established hue names are combined with a simple, logically chosen group of adjectives designating value (lightness or darkness) and chroma (departure from gray). But the possible number of such names is limited — there are 267 in the system — consequently they necessarily refer to blocks of color rather than to single chips in the Munsell system. To designate the chip specifically it is necessary to use the Munsell symbol.

There has been an unfortunate tendency in archaeology to employ color names and omit symbols or relegate them to parentheses. It is important to recognize that the Munsell symbols designate the 3 color attributes more specifically and precisely than is possible with words and that they allow systematic interpolation; that is, when a satisfactory match cannot be made, the deviation of the sample in hue, chroma, and value can be estimated and recorded by the symbol. Only a little practice is required to read these symbols and they permit color comparisons that are impossible with names.

Recommendation of a color standard raises the question of its value in pottery description. Dissatisfaction is often expressed because of the impossibility of making an exact match. This attitude is largely a consequence of failure to recognize the possibilities of interpolation. The principal objection has been that a few color readings are inadequate or even meaningless in view of the wide color range of many pottery types. This is true, but the idea that variability of a feature renders accurate description unnecessary is patently fallacious. The point of color description is missed when it is thought of in terms of color readings for a few "representative" sherds. Pottery color is determined primarily by composition of clay and firing conditions, each of which can be broken down into a number of variables. Color becomes a useful tool in pottery analysis to the extent that it can be used to distinguish the effects of these 2 groups of factors. Clays can be compared with respect to color when they have been fully oxidized and given similar heat treatment. Under these conditions pronounced differences in hue are indicative of differences in composition. Oxidation is shown by relatively high chroma. Low chroma and shades may indicate incomplete oxidation, reduction, or smudging. When color is thought of in these terms, matching will be preceded by a sort of sherds to ascertain the highest chroma of a pottery type, the extremes in the 3 color variable, and the range within which the majority of sherds fall. The ISCC-NBS color names may be useful in referring to ranges, but all descriptions should be recorded by symbols. When a standard is used in this way, color matching ceases to be a tedious mechanical chore and becomes instead an aid in understanding pottery techniques.

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An Introductory Handbook of Texas Archeology. DEE ANN SUHM AND ALEX D. KRIEGER. With the collaboration of EDWARD B. JELKS. Bulletin of the Texas Archeological Society, Vol. 25, Austin, 1954. viii + 582 pp., 7 figs., 134 pls. $7.50.

This volume consists of 2 main parts. The first is "Texas Culture Complexes: Discussions and Trait Lists." In this section Texas archaeology is divided into 7 areas, Trans-Pecos, Panhandle-Plains, North-Central, Central, Coastal, Southwest, and East. The cultural manifestations of each area are discussed under 4 culture stages: Paleo-American, Archaic, Neo-American, and Historic. Phases, aspects, foci, and components are described and trait lists are given for each stage as are cultural relationships, estimated ages, and some bibliographic sources. The second part is "Selected Pottery and Projectile Point Types: Descriptions and Illustrations." Here are presented, alphabetically, 73 pottery types, 6 miscellaneous pottery groups, 2 spear point types, 57 dart point types, and 22 arrow point types. These named types are described in detail and well-illustrated.

This handbook is a useful compilation of the researches of the many archaeologists who have worked in the Texas area during the past quarter century. Its value is obvious. For those working in the area it will provide a detailed working framework of cultural reconstruction.

For those unfamiliar with the area it will furnish data on culture content and culture sequences. The section on pottery and projectile point types gives a basis on which local collections may be classified and interpreted. Few if any geographic areas of New World archaeology have such a comprehensive and concise reference volume.

Despite its unquestioned usefulness, however, this handbook has some very serious defects and should be used with extreme caution. Being a compilation, it reflects the work of many people. Their results are synthesized and restated with varying degrees of accuracy. In many instances the enumerated details and interpretive restatements are in agreement with the factual data and interpretations of those who did the original research. In other instances some of the factual data have been ignored or misstated and new interpretations made.

One of the basic assumptions upon which this whole volume seems to rest is that in a synthesis the authors are required, or at least are entitled, to make whatever changes of terminology and interpretation they see fit without regard for current usage or previous interpretation. In the introduction (p. 14) it is stated that, "The reader is to assume that the present wording is our best estimate, the previous ones obsolete." I object strongly to this assumption and attribute to it many of the statements and interpretations with which I disagree. It seems unduly high handed for these authors to arbitrarily declare "obsolete" the conclusions of other capable archaeologists whose work they are purportedly trying to synthesize.

On the basis of this assumption the names for the culture stages have been changed from those in current usage. "Paleo-Indian" has been declared obsolete and the term "Paleo-American" substituted. This was done because, "There is growing doubt that the earliest migrants to the New World from Asia were truly Indians" (pp. 15-16). The traditional term "Archaic" is retained for the second culture stage. The term "Neo-American" has been coined for the third stage. Does this imply that there is "growing doubt" that the people of this period were "truly Indians" too? The term "Paleo-Indian" has been satisfactorily in use for many years to distinguish the earliest migrants to this continent from the later migrants or "Neo-Indians." These terms are not based upon physical type at all. The "Paleo-Indian" physical type is not known. To base a new term on a "growing doubt" about a physical type that is not known and has never been used as a terminological determinant is wholly unwarranted. Furthermore the new terms do not distinguish between culture types, physical types, or ultimate origins any better than do the older terms. It is only a meaningless word substitution. This whole set of terms for the culture stages is, moreover, internally inconsistent. "Archaic" is in no way parallel to the terms for the preceding and following stages. Is it implied that the "Archaic" people were not American? Perhaps they were "truly Indians."

The authors have made many other unnecessary changes. On pages 59-62 the Livermore focus is declared obsolete because they say it is based upon only a single arrow point type at a single site. Here factual data have been ignored. This focus is based upon a rather respectable cultural complex and a respectable number of sites as pointed out by the original investigators (see references on p. 62). On pages 102-12 the Clear Fork, Round Rock, and Uvalde foci seem to have been declared obsolete. At least 7 competent students have utilized, under various terms, these subdivisions of the Edwards Plateau aspect with clarity and understanding. As I read them I believe that these students have demonstrated these subdivisions "with intensive analysis of artifacts in different levels" and with "pertinent data on excavations" (p. 107). Furthermore the present handbook even lists these students and their work on pages 106-7. Likewise the Toyah and Austin foci have been declared obsolete on pages 112-7. In my own work with the Central Area materials from the Whitney Reservoir I have found these focal designations quite useful and fully valid.

Another error is the statement on page 88 that I placed the Wylie focus in the Fulton aspect but have "since withdrawn this in favor of treating Wylie focus as an amalgamation of traits which can not easily be placed in any known aspect." I am unaware of any such withdrawal. I would certainly place the Wylie focus in the Fulton aspect, though temporally, geographically, and culturally it is a fringe culture within that aspect. Just as a minor factual correction, the "one burial" in the rim earth of the pit at the Hogge Bridge site (p. 88) was actually a burial area of 7 interments containing 13 individuals. There are scores of such errors and misinterpretations in Part I of this handbook. Most of them are minor but many are of real significance for an understanding of the most widely accepted interpretations of Texas prehistory. They lead to misconceptions and confused terminology and are particularly curious when in the introduction superfluous names, changed names, and conflicting or overlapping terminology are so specifically deplored. Terminological confusion is especially rampant in Part II of this handbook.

The manner of presentation of the pottery and projectile point types is excellent. Krieger, Kelley, Jelks, and I, with others, have long discussed the need for such a presentation. It is a sort of dictionary or catalog of types that should be an invaluable aid to anyone working in the area. But to be useful as such, the types themselves must be individually valid and based on the best available data. Most of the pottery types are. Most of them are types that Krieger has devised and worked with for many years. We have all found them generally valid and useful.

The treatment of projectile points is, on the other hand, another example of ignoring basic research. In a few months these authors reanalysed and realigned a large mass of material which other investigators had patiently analysed over a period of years. The types presented here are based principally on a card file of projectile point types devised by J. Charles Kelley almost a decade ago. All of us working in Texas have had constant access to that file and have used it to great advantage. Some of the types have been published. Others perhaps should have been. But many of them were only

tentative types and not enough was known about them to warrant publication. The authors of this handbook have reshuffled these types, coined new names for some, and assigned new meanings to them that are totally unwarranted. They have combined forms into newly named types that make no sense at all. The result is confusion rather than clarification. For example, I see nothing but confusion in the mass of forms illustrated in Plate 78 as "Pogo Points," and in those grouped on Plate 81 as "Bulverde Points." Types long in use with real cultural significance such as "Baird Beveled Blade" and "Taylor Thinned Base" have been declared obsolete and lumped under the term "Tortugas Points" (pp. 402, 480, 482). There are real and consistently recurring differences of attributes between these types and their combination is unjustified.

These few examples illustrate the defects of this handbook. Although it is a good book in concept, style, and organization the reader must be careful to use it in conjunction with the many original sources from which it is derived. This necessity largely deprives it of much of its potential usefulness.

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An Introductory Handbook of Texas Archeology. DEE ANN SUHM AND ALEX D. KRIEGER. With the collaboration of EDWARD B. JELKS. Bulletin of the Texas Archeological Society, Vol. 25, Austin, 1954. viii + 582 pp., 7 figs., 134 pls. $7.50.

Archaeological handbooks are always welcome and the present volume, which attempts to present systematically the cultural complexes and the projectile point and pottery types of the Texas cultural "shatter-belt," is no exception. However, since any such handbook tends to replace the original and scattered sources on which it is based, the authors of such a book have the responsibility of producing a work which is dependable as to both facts and interpretation. In this the present Handbook fails; rarely has such a collection of errors appeared in print.

In the space available it is impossible to list even the outstanding errors noted in the Handbook. Accordingly, I will restrict this critique to a discussion of general shortcomings of the work and to a listing of some of the specific errors in those sections on Trans-Pecos and Central Texas where I have had extensive field and laboratory experience.

Notably lacking from the Handbook is any discussion of the "alluvial chronology," the body of data acquired from various careful studies of the correlation of formations in the valley alluvium and stream terraces with the local archaeological sequences, which provides the main framework on which rests the correlation of Texas archaeological complexes within Texas and with those of the Southwest and the Plains. Available data regarding the relation of the archaeological complexes to their geographic environments and the ethnohistorical data which provide the basis for their interpretation are likewise largely ignored. No protest of lack of space or time can justify the omission of such vital data; disagreement may legitimately be expressed with some of the correlations advanced but nothing justifies completely ignoring such important evidence.

A sampling of errors from the Handbook coverage of the archaeology of the Trans-Pecos area will indicate the general quality of the reporting. The Santiago complex does not antedate the Pecos River focus (pp. 27, 29, 51, 228) but rather was its contemporary (see J. C. Kelley and others, 1940, *West Texas Hist. and Sci. Soc., Publ.* No. 10). According to published estimates of the age of the Pecos River focus (p. 56) it is thought to have begun "shortly after 4000 or 2000 B.C. and continued dominant until about 1000 A.D." (see J. C. Kelley, 1947, *Am. Antiq.*, Vol. 13, No. 2, pp. 97-104). Its principal relationships actually do not appear to lie toward the east (p. 52) but with the "Archaic" cultures to the west. The term "Hueco phase" essentially refers to Chisos focus components in the northern Trans-Pecos and in southern New Mexico which were in close contact with nearby Puebloan cultures and produce Southwestern trade items. Evidence that the Hueco phase developed out of a specifically "Cochise" culture (p. 31) is lacking, and to call it a branch of the Mogollon culture (p. 31) is to distort the facts. It also seems very doubtful that the Mesilla phase developed out of the Hueco phase (pp. 31 and 36), which actually continued in existence for centuries thereafter, and Southwestern intrusives in Hueco phase components include not only ceramics of the San Marcial phase (p. 35) but also those of Mesilla, Dona Ana, and El Paso phases.

The Handbook discussions of my Livermore focus (pp. 30, 60-62) so distort the facts that it is difficult to credit the many errors to carelessness alone. This is not a "nebulous" focus; it is known from many sites, not just one; intrusive El Paso phase ceramics occur only in late mixed components of the focus. The long time span attributed to the focus is based on published evidence which the Handbook authors have simply ignored. In rejecting my tentative A.D. 800-1200 dates for the Livermore focus in favor of a 1200-1400 dating (p. 62) the authors forgot that they had elsewhere noted the presence of Livermore intrusives in the Mesilla phase (pp. 39 and 502), for which they had accepted without protest an estimated date of A.D. 900-1100 (p. 39). The distribution of the Livermore focus as shown (Fig. 5, p. 231) is completely erroneous; the focus occurs throughout the Texas Trans-Pecos area, the lower Pecos River valley, and in southeastern New Mexico.

The Alamito and Presidio foci of the Big Bend region are not included in the Bravo Valley aspect (pp. 29 and 45); instead they represent the modern Mexican and Anglo American occupance. Although the Concepcion focus survived into the early historic period it was largely a prehistoric occupation and should not be designated "Historic" (p. 49) — just as the authors fail to classify the Rockport focus of the Gulf Coast as "historic" even though it survived quite late (pp. 125-7).

The Handbook authors, in writing of the Central area, ignore my "Balcones phase" and reject any division of

the Edwards Plateau aspect into foci (pp. 102-4) although both Sayles and I found clear-cut evidence for such divisions. Their discussion of the Texas "Archaic" indicates a lack of comprehension of the theoretical problems involved in the interpretation of the archaeological remains of simple food-gathering and hunting cultures. So important do I consider this theoretical approach that I plan to write a separate article on it and will accordingly refrain from further discussion of it here.

The Handbook's treatment of the Central Texas aspect is superficial and ignores much of the available evidence. Again, the authors reject a division of the aspect into foci (pp. 112-7). The distribution of the Central Texas aspect on their map (Fig. 5, p. 231) entirely ignores the westward extension of the Toyah focus between the Rio Nueces and the Rio Grande, an area in which it appears without the Austin focus admixture which so often characterizes its components in central Texas. A beginning date of A.D. 500, or even 800, for the Central Texas aspect requires more evidence than a simple statement (p. 117) when other available evidence suggests a much later appearance. Likewise a terminal date of A.D. 1000 for the aspect appears completely incredible in view of the appearance of its traits as intrusives in Bravo Valley aspect components to the west which date, on the basis of Southwestern intrusive ceramics, between A.D. 1200 and 1400, and even later. If new and revolutionary chronologies and interpretations are used in a Handbook presentation they should by all means be fully substantiated through citation of the evidence.

I find the Handbook section (pp. 397-512) on lithic typology in Texas extremely interesting, because of my personal research stake in this field. Between 1940 and 1943 I applied a typological method borrowed from Southwestern ceramic studies to the analysis of projectile point collections, numbering over 12,000 specimens, and isolated a series of projectile point types (referred to in the Handbook as "type names" which were "coined by J. Charles Kelley many years ago") characteristic of the complexes of central, southern, and western Texas. Although I have not published this typology in detail, it has been loaned freely to all interested workers, many of whom have utilized it in their own work. Between 1940 and 1943, Krieger, who had employed in his Texas work up to that time a simple descriptive-classificatory system, became converted to this methodology and adopted it as his own (see A. D. Krieger, 1944, "The Typological Concept," *Am. Antiq.*, Vol. 9, No. 3, pp. 271-88). In the present Handbook, Krieger states that the authors have now "done the projectile-point typology over again for central and western Texas, at considerable labor" (p. 15). Not unexpectedly, since both Krieger and Jelks had free access to my type file for some years, their "restudy" has resulted in a typology which parallels my own fairly closely. Occasionally they have departed from my typology, in some cases with what appear to be sound reasons, in others apparently out of ignorance of the specimens, or on the basis of new and unspecified data. Since the critique of this new typology and its correlation with my own demands the space of a separate paper I will reserve my comments until later.

Despite its shortcomings, the Texas Handbook has utility, if used as a guide to the source material rather than a replacement for the original sources, and should be used by all American archaeologists. It is to be hoped, however, that the authors will reexamine their sources and issue an *errata* supplement.

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Reply to Stephenson and Kelley

Stephenson has shown an appreciation of the difficulties faced by anyone who tries to synthesize the data and opinions in Texas archaeology. Most of his criticisms are based on a misreading of the paragraph from which he quotes a single sentence. Thus he brands as "unduly high handed" an assumption which he ascribes to us that we were entitled to change everyone else's terminology and interpretations to suit ourselves. We suggest that Stephenson read again the sentence on page 14 which he quotes, as well as the 2 preceding sentences. These are solely concerned with *certain type descriptions*. We merely stated that, where changes of opinion had taken place since the time when some of these descriptions were originally published, we considered the present formal descriptions to be "our best estimate" and the previous ones "obsolete."

Stephenson is wholly unjustified in taking this reference to obsolescence and sarcastically applying it to the several *culture terms* which he mentions. He also says that, "On the basis of this assumption the names for the culture stages have been changed from those in current use," and that the terms we used for 4 general culture stages (Paleo-American, Archaic, Neo-American, and Historic) are only "a meaningless word substitution," inconsistent among themselves We would be among the first to acknowledge that these 4 "stages" are far from ideal. Yet, considering the state of affairs in analyzing Texas archaeology, and the fact that American archaeologists as a whole are still far from devising any consistent set of terms for general stages, we felt that ours would have utility without too much confusion. Any scheme of terminology will present difficulties; the important thing is that the authors explain what they are doing. This we did.

In any synthesis of the work of scores of other persons, the authors have to struggle with their own consciences, trying to decide just what to use and how far to go with each discussion. To satisfy everyone that he has been fairly quoted or paraphrased seems to us an impossibility. Differences in opinion as to what is right and what is wrong are inevitable and may even be beneficial, if they stimulate those who have the data and ideas to publish them. For example, Stephenson says that the Clear Fork, Round Rock, and Uvalde foci have been utilized "with clarity and understanding" by several students, and that these subdivisions of the Edwards Plateau aspect have

been demonstrated with "intensive analysis of artifacts in different levels and with pertinent data on excavations," which were the criteria we asked for in the Handbook. He refers, of course, to the intensive analyses performed by Kelley in the 1940's on WPA excavations he made in central Texas in 1939-41. We do not, however, understand how we could be expected to use this basic material when it had never been published, and had been removed from the state 5 years previously.

Without it, we had no recourse but to draw up a general trait list for the Edwards Plateau aspect, based primarily on our own experiences with this material. It must be realized that Kelley subdivides this aspect into 3 foci primarily through *a single projectile-point type* as the "diagnostic trait" of each "focus." Moreover, each of the 3 "diagnostic" types also occurs in large numbers in the other 2 foci; and in each case the "diagnostic" type is only one of many projectile-point types which occur in varying frequencies in all 3 "foci." Nothing whatever has yet been offered on what one is to do with the tens of thousands of artifacts other than projectile points which occur throughout the areas of these "foci." We do not doubt that the Edwards Plateau aspect contains cultural differentials, but until these are defined in detail by anyone capable of doing so, it is best not to try to identify them in practice.

The Austin and Toyah foci of the Central Texas Aspect were also originally recognized by Kelley, again each with a single projectile-point type as the "diagnostic trait" — *Scallorn* points for the Austin focus and *Perdiz* points for the Toyah. Not only do these 2 types occur together over tens of thousands of square miles in Texas, but they also are accompanied by large numbers of other artifacts about which nothing has been said on how to distinguish those of one focus from the other. In spite of this absence of definition, both Stephenson and Kelley insist that such foci should have been given better treatment in the Handbook. At the time of writing it, both Suhm and Jelks were starting new analyses of the Central Texas aspect from their own excavations; when they have completed this we should know more about these foci. Meanwhile the term "nebulous" seems entirely fitting for any culture complex which has never been described in more than a few lines, or at most a paragraph or two. This applies as well to the Livermore focus in Trans-Pecos Texas, over which both Stephenson and Kelley deplore our ignorance.

It seems odd that neither reviewer questions the accuracy of a single trait list in the Handbook. This, after all, was one of our 2 major objectives, the other being the presentation of formal descriptions and illustrations for a large number of pottery and projectile-point types.

Both reviewers deplore our ignoring "basic research" in Texas projectile points and mention the card file devised by Kelley in the early 1940's. Stephenson states that the types described in the Handbook are "based principally" on Kelley's file; that "all of us working in Texas" have used this file to great advantage; that some of Kelley's types have been published; and that all we did was to reshuffle these types in ways that make no sense at all. The truth is that Kelley's card file applies to perhaps a quarter of the state and is by no means complete for that; that the cards show only a selection of from 1 to 3 or 4 specimens for each type, unaccompanied by any explanation of their characteristic features, ranges of variation, or distribution; and that he provides no clues on the cards or anywhere else on how to unravel the multitudinous overlappings one must face in the laboratory. Kelley has published the *names* of *some* of his types but this is a far cry from the publication of detailed descriptions or adequate illustrations which would aid in identifying the great majority of specimens. In short, we found it impossible to work with this file in practice. Not wishing to wait another 10 or 15 years for a usable projectile-point typology for central Texas — not to mention the rest of the state — we decided to do something about it ourselves. If the results are useless and confusing to the 2 reviewers, that is too bad. No one else has objected to our basic intention of trying to achieve some unity of concept for the state as a whole, although there have been — and always will be — arguments as to just what variations should be included in anyone's "types." No "types" can be permanently fixed, not even Kelley's: They must undergo changes from time to time as information and perspective increase. It would have been best not to have used any of Kelley's type names. However, a completely new set of names for central Texas types would really have caused confusion, and we tried to give recognition to his research by using those type names which had gained some usage in his and other publications, even though detailed descriptions were lacking.

The reviewers state that the Handbook must be used with great caution. We agree. So should the publications of the 2 reviewers, and so should thousands of others in American archaeology or any other field of research. Undoubtedly some of our alleged errors are real ones and will be resolved eventually by those who can approach the problems impartially. Other alleged errors are a matter of opinion even now, depending upon what material is available for use, where it is kept, and what interpretations one is trying to prove. It is very easy for anyone to brand the Handbook as "full of errors" or "errors too numerous to mention" as long as that person persistently avoids having to produce his own researches in print. We suggest that Kelley can make 2 major contributions to Texas archaeology: (1) he can quit reviling those who attempt to get along the best they can without his unpublished researches; and (2) he can put together his basic data and interpretations in print. Until then, it seems pointless to perpetuate arguments which swirl around in this vacuum, now of some 15 years duration.

Kelley criticizes our ommission of his alluvial chronology in central and Trans-Pecos Texas (he implies that this applies to the whole state, which it does not). This chronology was published by him in the 1940 and 1947 papers he cites and is available to anyone. It might have been worked into the Handbook, but we were plainly concerned with outlining culture complexes, not their

associations with terraces or any other geological features. As to the "facts" of archaeological dating in Trans-Pecos Texas, much of what we said was taken from Lehmer's 1948 publication, which we found a great deal clearer and more orderly in presentation than anything yet published by Kelley on that region.

The "Balcones phase" is a term used by Kelley for years. One reason we did not use it was that we did not interpret anything in the Handbook on the "phase" level in the McKern system, using only "foci" and "aspects" and discussing their relative chronological positions within our 4 "stages." An exception occurred in extreme western Texas where "phase" has been used by Southwestern archaeologists in approximately the same sense as the "focus" of McKern. Kelley says that we are ignorant of the theoretical basis for the "Balcones phase." We probably will be until he publishes on this too. He says that it is *not* true that the affiliations of the Pecos River focus lie to the east, with the Edwards Plateau aspect, but that they lie to the west. This may be his impression although no one can really determine the affiliations of this focus until stratigraphic excavations are made in that area (none have, despite its great richness) and statistics are available to show the relative frequency of its various artifact types. We found that the majority of the projectile-point *types* (if not actual specimens) and many other kinds of stone artifacts of the Pecos River focus are held in common with the Edwards Plateau aspect to the east.

Returning for a moment to the Austin focus, Kelley attributes to Krieger a "terminal date" of A.D. 1000. He misread the line on page 117 which says: "Krieger . . . would now place beginning somewhere between 500 and 1000 A.D." With the recent stratigraphic excavations of Jelks and Suhm, it is more difficult than ever to decide an ending date for the Austin focus and it is even questionable whether it survived into historic times, as both Kelley and Krieger once held. At any rate, it is incongruous, to say the least, to have Kelley demanding once more that evidence should be shown to support our statements when he has not yet provided field and laboratory evidence for his own statements.

The reviews raise several other points which we cannot attempt to argue here. It seems obvious that detailed field reports will do more to resolve differences in opinion than any amount of discussion of unpublished data.

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General Index to "Antiquity," a Quarterly Review of Archaeology, Vols. I-XXV, 1927-1951. Edited by O. G. S. CRAWFORD. Antiquity Publications, Ltd., Ashmore Green, Newbury, Berks., 1956. 153 pp. $7.50.

Few tools of research are more indispensable than the periodical index, and it is welcome news that the first 25 years of *Antiquity* can now be searched with ease and efficiency. Some 500 articles and more than twice that number of reviews have appeared in that time, and both are comprehensively indexed in 2 separate lists. Although the majority of both articles and reviews treat of Old World rather than New World subjects, in recent years *Antiquity* has devoted increasing space to Americanist matters, and it has always dealt with subjects of general interest such as aerial photography and the techniques of tool making. Those familiar with the journal respect and value it not only for the breadth of subjects it embraces, but for the lucid, nontechnical manner in which it is written. Perhaps nowhere else have archaeological subjects been consistently presented with such admirable insight and appreciation. This index, carefully arranged and beautifully printed, will be a valuable guide to numerous articles of general interest as well as to more specialized articles and reviews.

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Archaeological Investigations on the Uncompahgre Plateau in West Central Colorado. H. M. WORMINGTON AND ROBERT H. LISTER. Proceedings, No. 2, Denver Museum of Natural History, Denver, 1956. xiv + 129 pp., 69 figs., 3 tables. $2.50.

Last year the Denver Museum of Natural History published the first number of a new series of the *Proceedings*. In that first number Wormington reported on and analyzed sites of the Fremont culture and included in her analysis a summary of the Uncompahgre complex. The greater part of this second number of the new series is taken up with reports on sites of the Uncompahgre complex and a comparison with other Southwestern cultures thought to be roughly contemporaneous with it. Another section of the publication is concerned with reports on Luster Cave, the Glade Park site, the Arroyo sites, and other sites assigned to somewhat later cultures of the same area. There are also supplementary reports on the geology of the Taylor Site by Charles B. Hunt, petroglyphs of the Alva Site by Al Look, and the maize from Luster Cave by Norton H. Nickerson and Ding Hou.

With the exception of the Arroyo sites mentioned above, and a petroglyph site in Sieber Canyon, the locations reported on are caves or rock shelters containing cultural debris ranging in depth from a few feet (as at the Moore and Casebier sites) up to 14½ feet (at the Taylor Cave). Associated with the Moore and Alva sites there are also petroglyphs depicting conventionalized natural figures such as birds, animals, bear paw patterns, and also grooves and scratches of uncertain significance.

The site reports in general reflect the care, accuracy, and technical excellence with which the excavations were carried out and which have characterized the authors' previous work. The "features" of the cave deposits such as the slab-lined cists and the hearths, as well as the stratigraphy and the artifacts are clearly described and well illustrated. Minor defects in the artifact descriptions, such as occasional obscurity regarding the materials or dimensions of particular specimens and artifact types, are outweighed by the thorough manner in which the flaked artifacts are reported. Projectile points, for example, are illustrated by both line drawings and photographs. Inasmuch as flaked artifacts constitute the majority of cultural items recovered, this emphasis seems particularly worthwhile.

Of particular note in this publication, is the analysis of the Uncompahgre complex for which a peculiar type of triangular adze-scraper is said to be diagnostic. As the authors state, this complex appears to be one of a group of cultural manifestations developing from the Desert culture. They compare the Uncompahgre complex trait by trait with other cultures with which it might have been roughly contemporaneous, and indicate the traits shared and those which were not shared. There is, of course, a certain amount of danger in comparing so specifically cultural manifestations occurring over such a range of time (a few millennia preceding the beginning of the Christian era) and over such a wide area (northern Utah to southern Arizona). For one thing, it implies an unusually detailed knowledge of a range of generalized or "basic" traits. Nevertheless, the authors have carried out this feat of comparison well and have included very few items with which the reviewer would disagree as far as his knowledge extends. This analysis widens our understanding of the Desert culture by making its component items more specific, and is a definite step forward in our understanding of Southwestern cultural development.

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Archeological Excavations in Beef Basin, Utah. JACK R RUDY. University of Utah Anthropological Papers, No. 20, University of Utah Press, Salt Lake City, 1955. viii + 101 pp., 27 figs., 12 pls., 12 tables. $1.50.

The 9 site excavations reported in this concise and amply illustrated paper represent the first effort to obtain details concerning the cultural make-up and affiliations of the prehistoric remains of Beef Basin, in San Juan County, southeastern Utah. Rudy believes the generally crude masonry sites of a few rooms represent family dwellings, only 2 pueblos of 7 and 25 rooms suggesting larger accretions. The one pit house is rectangular with rounded corners; it has vertical slab walls with posts set between the slabs and a ventilator on its long east side. Three other pit rooms, lacking postholes, are thought to be kivas as they contain stone-lined ventilators on the south, slab deflectors, firepits, and sipapus. They lack, however, the southern recesses, pilasters, and banquettes found in later kivas.

There is little of diagnostic value in the sparse collection of artifacts. For example, 3 point types occurred in equal numbers and 4 types of metates were found at one site. Two items normally not associated with the San Juan Anasazi pattern were noted — a ¾-grooved axe and a basketry fragment with a single, split-rod foundation.

The ceramic assemblage represents a late Pueblo II to early Pueblo III transition. All sites yielded corrugated pottery. Rudy's corrugated types exhibit the same variety in surface treatment as found on Mancos Corrugated, a Pueblo II and early Pueblo III type of the Mesa Verde area. He separates Mancos Black-on-white into 2 varieties, one with carbon and the other with mineral paint. The former appears to be quite similar to McElmo Black-on-white, and perhaps should have been so named.

Rudy concludes that the material recovered represents an extension of the Mesa Verde branch. Though he does not state so specifically, his evidence combined with that from sites in western Colorado north of the Dolores River suggests that occupation by the northernmost Anasazi did not persist much after A.D. 1150, all classic Pueblo III elements of the Four Corners region being absent.

Several editorial inconsistencies mar this report and make it difficult for the reader to correlate certain data. Rudy made use of feature numbers (F-1, and so on) in his manuscript, and in converting these for publication, the editor neglected to make all the necessary changes. The third and fourth paragraphs of page 49 are confusing. In the third it is stated that the larger kiva at this site was earlier, and in the fourth, the smaller kiva was earlier. Inquiry directed to Rudy for clarification resulted in his furnishing a carbon copy of his manuscript wherein he states "the use of vertically placed wall slabs and small filler stones in the recess walls between the pilasters of the large kiva [42Sa207] were also found in the smaller kiva at site 42Sa45 [Ridge Site]. The smaller kiva at site 42Sa45 is believed to be the earlier of the two kivas at the site."

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Late Mogollon Pottery Types of the Reserve Area. JOHN B. RINALDO AND ELAINE A. BLUHM. Fieldiana: Anthropology, Vol. 36, No. 7, Chicago Natural History Museum, Chicago, 1956. Pp. 149-87, 34 figs. $1.25.

This publication is a well-illustrated and valuable supplement to the excavation reports of the Chicago Natural History Museum for the Reserve region of east central New Mexico. Basically, the authors have taken the Upper Gila Corrugated and Reserve Polychrome types of Nesbitt and described 7 new brown ware types. The sequential and taxonomic relationships of these types are also presented. The general reliability of these new types is attested by recent work in the adjacent Point of Pines region. One of the most valuable contributions of this paper is the first complete description of Tularosa

Black-on-white, a type which has had wide geographical significance and which has heretofore been only partially described by a number of workers.

The format for the pottery type descriptions roughly follows that established by Colton and facilitates comparisons with other types from different areas. However, an additional comment for each type regarding comparisons and pertinent remarks would be valuable.

A current taxonomic problem of Southwestern ceramics, that of the validity, use, and scope of the pottery variety, is raised by Rinaldo and Bluhm. They have formulated Smudged Interior varieties to cover the smudged bowl forms of 3 corrugated types. It is the opinion of some Southwestern workers that these bowl forms should be included within the range of vessel shapes for the general type and not elevated to the status of a separate type, especially when there is a similar spatial and temporal distribution.

The authors state that the surface treamtents of incising, punching, polishing, smudging, scoring, and neck banding are found earlier in the Mogollon (Reserve region) than in the Anasazi area. This reiterates the currently favored hypothesis that much of the cultural impetus in the American Southwest can be traced from the southern limits of the Southwest towards the Four Corners country.

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A Trial Survey of Mexican-Southwestern Architectural Parallels. Edwin N. Ferdon, Jr. Monographs of the School of American Research, No. 21, School of American Research, Museum of New Mexico, Santa Fe, 1955. 38 pp., 3 figs. $1.50.

Montezuma's Castle, Aztec Ruin, Toltec Ruin, and other similarly designated archaeological sites in the American Southwest, bear witness to the fact that in the past persons were striving to connect the cultural remains of the Southwest with those of central Mexico. Most such early attempts were highly romanticized, were oriented around the migration myths of the Aztecs and their predecessors, and sought to derive the Mexican cultures from a Southwestern source.

As scientific work progressed in the Southwest, it was soon evident that cultures in central Mexico and the Southwest held many elements in common, and that a number of the Southwestern traits were in all likelihood derived from the south — the reverse of the earlier popular notions. Fundamental to the cultures of both areas were maize cultivation, pottery, cotton, and so on, elements which appear to have spread northward during the development of Southwestern cultures. Other culture elements of southern derivation, such as ball courts, clay figurines, certain vessel shapes, copper bells, mosaic plaques, have been shown to have reached the Southwest, particularly the Hohokam area, more recently.

Ferdon now suggests that a number of architectural features which appear in Anasazi and/or Hohokam cultures after A.D. 1050 also may be attributed to Mexican sources. Ferdon describes core masonry, square columns, platform mounds, compounds, column-fronted galleries, and circular masonry towers, notes their occurrences in the Southwest, and points out their Mexican parallels. The paper is extremely thought provoking, even if one might question a number of its premises. Basic to the problem is whether or not Ferdon is correct in establishing parallels between these selected architectural features in Mexico and the Southwest. Also, the known distribution of these features makes it difficult to link the 2 regions at this time. These and other questionable aspects are fully recognized by Ferdon; however, he has presented the facts as they appear to him in order to bring the matter to the attention of other investigators and to stimulate field work in the connecting area between the Southwest and central Mexico. Ferdon is to be congratulated for assembling and reporting upon these data. The paper is strongly recommended to all students of New World prehistory.

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Fray Bernardino de Sahagún, 1499-1590. Luis Nicolau d'Olwer. Historiadores de América, No. 9, Comisión de Historia, No. 40, Instituto Panamericano de Geografía e Historia, Pub. 142, Mexico, 1952. 229 pp., frontis. $20.00 (Mexican pesos).

The works of Fray Bernardino de Sahagún constitute a basic and primary source for our knowledge of Aztec culture during the years of the Conquest. His principal compilation, *The History of the Things or New Spain*, is in effect an Aztec encyclopedia, as is attested by the title he himself gave to his work, *Twelve Books of Things Divine (or Better Said Idolatrous) Human and Natural of New Spain*. This momentous assemblage of data was conceived, planned, directed, and revised by Sahagún. However, the text proper tells us little of Sahagún the man, for several reasons: his hand was unsteady and his writing hardly legible, hence his reliance on native scribes; he directed the transcription of all the information dictated to him and his scribes by native informants, thereby securing a wholly Aztec version; his rendition of the Aztec text into Spanish, since it was translation, afforded Sahagún little opportunity to interject his own ideas.

The present study provides a well-written account of the life and times of Sahagún. The author presents Sahagún's activities chronologically, encompassing 60 years of study and labor in Mexico. A consideration of Sahagún's working methods, the prevailing ideologies of the time, and a detailed discussion of Sahagún's manuscripts, their location and their publication, complete the study.

Faced with a paucity of biographic references, the author drew from the extended prologues and appendices which accompany each division of Sahagún's writings. At the beginning and end of each major topic, Sahagún answers his numerous critics, supplies the names of many

of his informants, evaluates the text in light of Christian doctrine, and explains the plan, organization, and purpose of his project. A second source utilized is the fragmentary and scattered references to Sahagún by his contemporaries: Motolinia, Fray Jerónimo de Mendieta, Fray Alonso de Molina, and others. A lack of unanimity prevailed within the Franciscan Order, among administrators, military leaders, and missionaries. Even Sahagún was not without some criticism from his coworkers, and his projected research waxed and waned with shifting alliances and alignments. Nicolau d'Olwer has skillfully woven these occasional references into his narrative to give us a clear picture of the ideological controversies prevalent during Sahagún's time. Sahagún's defense of his views and his obstinate determination to complete his work in the face of criticism by his superiors reveals a quite human and dedicated missionary. The author utilizes and acknowledges the writings of other competent students of Sahagún. Especially helpful to him were studies by Wigberto Jiménez Moreno, Angel María Garibay, and García Icazbalceta.

While the book is a must for students of Aztec culture and colonial Mexico, it merits careful reading by students of the history of anthropology. Those who would trace the development of ethnological field methods will find Sahagún's fieldwork described in welcome detail. The outlining of the project, the choice and utilization of informants, his methods of revision, attest a plane of scientific investigation of unusual excellence for the 16th century. The Nicolau d'Olwer study is the result of extensive and careful search in published sources and in the archives of Mexico. It is to be hoped that because of his familiarity with the Sahagún manuscripts and literature, he will publish in article form subsequent findings which his studies may reveal.

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Florentine Codex: General History of the Things of New Spain. Book 12—The Conquest of Mexico. Fray BERNARDINO DE SAHAGÚN. Translated by ARTHUR J. O. ANDERSON AND CHARLES E. DIBBLE. Monographs of the School of American Research, No. 14, Pt. 13, School of American Research and University of Utah, Santa Fe, 1955. 122 pp., 21 pls., 3 maps. $6.50.

The translation of the Nahuatl of Sahagún's *Florentine Codex* reaches its halfway point with this publication of Book 12. Books 4, 5, 6, 9, 10, and 11 remain to be issued. In Book 12, the last of the books of his opus, Sahagún and his native informants described the fall of the Aztec state in 1519-21. It is, in a number of respects, the most detailed and satisfactory of the native records of the conquest of Mexico. The book presents a narrative account beginning with the supernatural omens of the preconquest years and ending with the capture of Cuauhtemoc and the Spanish demand for gold. Much miscellaneous material is introduced on deities, government, calendar, and other subjects more systematically treated elsewhere by Sahagún, but the theme is the chronicle of the conquest: the Spaniards' arrival on the coast, their entrance into Tenochtitlan, the Noche Triste, and the final conquest of Tenochtitlan-Tlatelolco in 1521.

It has frequently been remarked of the Sahagún writings that the Nahuatl furnishes a basic text and that the Spanish only summarizes, roughly parallels, or corrupts the sense. The point is well taken and it is exemplified in Book 12 in Chapters 15 and 19, where the lengthy Nahuatl passages are balanced by a perfunctory Spanish digest. (The present edition omits the Spanish text save in occasional footnotes.) Some graphic Indian views of the Spaniards' character, as their thirst for gold ("They stuffed themselves with it, and starved and lusted for it like pigs . . . , all the while babbling [and] what they said was gibberish.") are likewise glossed over in the Spanish. But it should be observed that the Spanish is sometimes informative where the Nahuatl is not. It explains locations, it offers additional comments, it does not assume — as the Nahuatl so frequently does — the reader's intimate knowledge of Aztec ways. Thus the Nahuatl text refers to Tlapaltecatl opuchtzin, of whom it is said *coatlan icha*, that is, his house was Coatlan. Which Coatlan is the one referred to? Without the Spanish text one would guess. With it we know immediately: "donde es agora la perrocha de s^{a}. catalina en el tlatilulco" (p. 113).

The Nahuatl text of this entire book and a translation into German have been available since the appearance of Eduard Seler's *Einige Kapitel aus dem Geschichtswerk des Fray Bernardino de Sahagun* in 1927. The present translation improves Seler's reading occasionally but on the whole parallels it closely. The English inclines toward the archaic ("Moctezuma would therefor be wroth. . . . Nay . . . verily shall you gird yourselves. . . . Had you, perchance, already, ere now, heard of it? . . . Who, forsooth, standeth?"). The attempt is made in most instances to render Aztec titles, formal offices, and class designations into English: *Calpixqui* is given as steward; *Cioacoatl* as ruler's vicar; *achcauhtli* as constable; *maçevalli* as common folk. It seems to me that there are unexplained inconsistencies in some of these renditions. The 3 Nahuatl designations *tecutli*, *tlatoque*, and *pipiltin* are all at times translated as noblemen and become in these passages indistinguishable in the English. *Tlatoque* is additionally given as rulers, *pilli* as prince, and *tecutli* as lord. *Tlacochcalcatl* is translated as general and *tlacatecatl* as commanding general, but *tlacochcalcatl* appears alternatively and inexplicably as commanding general. It may be argued that these are insignificant variants, justified by context. But the counter argument, that the *tlacochcalcatl* and *tlacateccatl* were not the same and should not be translated by the same phrase, has a technical validity nevertheless.

The editors' explanatory notes are particularly useful for place names and for flora. The longest note, falling outside of the normal pattern of economy in comparative citation, consists of a series of quotations concerning the death of Montezuma. One could expect, I think, fuller explanation regarding the spelling Tzayectzin (Tzaiectzin) (p. 88), inasmuch as the Seler Nahuatl text, the deriva-

tive Spanish 1946 text, and Torquemada all give Tzoyectzin or a variant, with "o" rather than "a." In the absence of such commentary we cannot be sure of the accuracy of this transcription. Again a [illegible] the omission of Quetzalaztatzin, present but lacking in the English on page 43—is Quetzalaztatzin, rather than Totomotzin the *tiçociaoa*... (as on p. 9), and are not the two confused? The statement that the "Aztec text skips Atemoztli" (p. 76) should surely contain an added reference to Seler's Aztec text, where Atemoztli *does* appear. Did Seler interpolate it?

Three maps accompany this edition: one of the lake systems of the city's environs; one of the island city showing the main subdivisions; and one that identifies place names within Tenochtitlan-Tlatelolco. Not all of the locations mentioned by Sahagún are now identifiable but one might argue that the map could have included some additional names. Thus Calacoayan and Ixtacala (Iztacala) were mapped by Rivero as late as 1899. In the first map I believe that Xoloc is misplaced and that it should be located slightly southwest of Tizayuca rather than southeast. In the other 2 maps, where some of the places are located only provisionally, there are a number of questionable points. The division indicated between Tlatelolco and Tenochtitlan is clearly inconsistent with the location and affiliation (as subsections of Cuepopan) of Colhuacatonco and Copulco. The Cuepopan mapped is not the same as the Cuepopan whose boundaries are indicated (according to Caso) on page 105, nor is the larger Cuepopan division properly bounded. The result is the enlargement of Tlatelolco in the second map, at the expense of Tenochtitlan. These cartographic defects are extraneous and do not bear on the quality of the translation as such, but they are unfortunate in view of Sahagún's own abundant topographic references.

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The Selden Roll. An Ancient Mexican Picture Manuscript in the Bodleian Library at Oxford. Descriptive commentary by COTTIE A. BURLAND and bibliography compiled by GERDT KUTSCHER. Monumenta Americana 2, Ibero-Amerikanische Bibliothek, Verlag Gebr. Mann, Berlin, 1955. 48 pp., 1 color plate, facsimile reproduction of the codex. DM 35.

The Selden Roll was first published in Volume 1 of Lord Kingsborough's *Antiquities of Mexico*, a work ungainly in format and available to most students only in libraries. Moreover it lacks the sort of critical comment that would make the significance of the codex clear to a general reader. The Ibero-American Library of Berlin is therefore to be congratulated on bringing out this important document in a thoroughly adequate form, which will greatly facilitate its future use by students. The codex is reproduced in black and white on a continuous throw-out cloth-backed sheet, particularly convenient to handle. The scale is a little over two-thirds of the original and the photographic reproduction is excellent. A detail in color is given on the frontispiece.

Burland's accompanying comment is scrupulously thoughtful, and what is quite unusual, highly readable. Proof is given of the authenticity of the codex and its date is conjectured to be within a generation of the conquest. Cogent evidence is presented on this point, and although one may wonder if a more thorough comparison of the line technique with that of pre-Columbian and later documents might not fix its date more securely, the argument so far as it goes is convincing.

The interpretative portions of the text are of necessity more speculative, but judgment in this matter depends so much on the credence given to conclusions based on previous studies, that criticism is best left to the proof of time. The codex is a fragment, which, as the commentator points out, is the beginning of a migration story with a legendary preamble, featuring the god Ehecatl-Quetzalcoatl. Dates are given in the Mixtec style, but the costuming of the figures is Aztec, and the author believes that the scenes take place within the orbit of the Toltec empire on the border of the Mixteca region. The protagonists of the story are 4 chieftains who apparently conquer a district in which they set up an image or mummy-bundle of Quetzalcoatl. From this the author concludes that the events recounted took place after the fall of the Toltec empire, and argues further that the latter event must have taken place about A.D. 950 since one of the characters of the story is also found in Codex Zouche-Nuttal in connection with an event dated in the middle of the 11th century. Unfortunately, this sort of chain reasoning has its hazards, for assumptions pile up, obscuring each other. It is understandable that the problem of Mexican chronology could not be reviewed in a work of this sort, but some warning to the unwary reader in this connection would not have been amiss.

The mythology and the symbolism of the Aztec is also interpreted with more boldness than the intricacies and uncertainties of the subject may warrant, but for the critical reader a series of notes and a bibliography are appended, which by and large make the rationale of the inferences easy to follow. It is not to be expected that authorities will agree on such controversial matters, but many will welcome and make use of this attractive volume which we trust will set a standard for other publications of aboriginal documents, many of which are still not as readily accessible to interested scholars as one might wish.

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Toward Definition of the Nazca Style. A. L. KROEBER. University of California Publications in American Archaeology and Ethnology, Vol. 43, No. 4, University of California Press, Berkeley and Los Angeles, 1956. Pp. 327-432, 12 figs., 16 pls., 23 tables. $2.00.

For nearly 30 years the paper by A. H. Gayton and A. L. Kroeber, entitled *The Uhle Pottery Collections from Nazca*, has been of special interest to Peruvianists, and of

general methodological importance to all persons concerned with archaeological reconstructions by statistical means. By analyzing and correlating the repertories of shape and design in the polychrome pottery of the south coast of Peru, Gayton and Kroeber established what was then only a probable sequence in time from clear and integral designs on simple shapes ("A" style) to ornate and prolix designs on complex shapes ("B" style), followed terminally by intrusive shapes and designs from other styles and areas ("Y" styles).

Kroeber's present paper is self-critical without sacrificing the essential ground gained 30 years ago. The essay under review was written to police and fortify the original position, because others will before long be publishing new studies on seriation in Nazca pottery (Bird, Dawson, Rowe), on stratigraphy (Strong), and on grave associations (Collier). Kroeber concedes that the transitional grouping called X between A and B, is not entirely defensible, but he holds his ground firmly on A and B, on the equation of Y1 with a terminal Nazca style, and that of Y2 with Coastal Tiahuanaco or Huari. Y3 is conceded as an agglomerate of A, B, and Y materials. He also concedes the inadequacy of the original 40-item repertory of design traits. Other errors in the 1927 paper are stated: the over-generalized conception of vessel shape, and the premature effort to achieve correlation in series before a full range of observations had been made. He recognizes that the Ocucaje collection should have been analyzed rather than the Nazca Valley collection. A new listing of 20 B-style designs is given, on the basis of pure-style lots, especially from Ocucaje. In the process, Kroeber adds many useful elements to the conception published in 1927.

Part I contains Kroeber's criticism of the 1927 paper; part II describes the revised shape-classes in great detail, with useful refinements in terminology and measurement. Part III gives the detailed discussion of 105 vessels. In Kroeber's own words, the purpose of the paper is "corrective." It manifests his intention to defend the A B Y seriation against recent efforts to substitute others.

For one, the reviewer prefers the flexibility of the A B Y seriation to Dawson and Rowe's overly concrete distinction between "monumental" and "cursive" styles. Rowe has denied the objectivity of B style, and he substitutes "cursive," for which a rigorous definition is much less operational than the shifting content that students have been able to assign on inspection and with growing familiarity to the B style. Detailed inspection of alternate schemes, however, will not be possible until others publish their seriations. On superficial acquaintance these look more like the A B Y scheme than their authors would care to admit.

No one since the 1920's has successfully questioned Kroeber's main thesis that items belonging to the same form-class can be arranged in correct chronological order by (1) shape-design correlations, and by (2) the postulate that in one form-class simple formulations are replaced by complex ones.

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CORRECTION

"The Radiocarbon Method of Age Determination"

In the article of this title, published in the July, 1956, issue (Vol. 22, No. 1, pp. 1-11) the captions of the first 2 figures were exchanged.

The caption for Figure 1 should read: "Radioactive Decay of a C^{14} Atom."

The caption for Figure 2 should read: "Nuclear Reaction Producing C^{14}."

NOTES AND NEWS

EDITED BY CLEMENT W. MEIGHAN

GENERAL

An international Conference on Radiocarbon Dating was held at Andover, Massachusetts, between October 1 and 4. The 1956 conference was under the chairmanship of Frederick Johnson and was sponsored by the R. S. Peabody Foundation and the National Science Foundation, with the assistance of the Socony Mobil Oil Company and the Humble Oil Company. There were 55 invited participants, including about a dozen archaeologists; the remainder were nuclear physicists, chemists, geologists, and other specialists concerned with the radiocarbon method. Twelve radiocarbon laboratories were represented at the meeting, 7 American and 5 European. At least 20 radiocarbon laboratories are now operating but not all have published dates yet.

The papers presented brought out much new information. Perhaps of greatest interest to archaeologists is the increasing refinement of the radiocarbon method. Some of the recent advances include: (1) Measurement of smaller samples than formerly. Some laboratories are now working with samples of less than one gram weight. (2) Decrease of statistical errors so that a smaller range of time can be given. Dates up to 7000 years now frequently have a plus-or-minus factor of only 100 years; some dates presented at the meeting are on the order of 3000 years with a plus-or-minus factor of only 50 years. (3) Increase of the measureable time span. Several dates of near 40,000 years have now been obtained and it is expected that still older samples can be dated soon. (4) Isolation and identification of some of the sources of error, permitting the use of several correction factors. Most of the sources of error are small, being on the order of 1% or 2% of the time span involved.

Problems of contamination of buried materials remain serious and were discussed at some length. It was generally felt that pretreatment and purification of samples should be done by the radiocarbon laboratories, but that collectors of field samples should use maximum care in observing and recording possible sources of contamination.

Commercial radiocarbon laboratories are expected to be in operation soon. The Nuclear Science and Engineering Corporation, Pittsburgh, will begin providing dates on a fee basis shortly, and there is a possibility that other laboratories of this sort will be constructed. Most of the existing laboratories have received their money to investigate certain lines of research, and archaeologists can no longer expect to have their samples dated free unless such samples contribute directly to the work of the radiocarbon laboratory. In writing requests for research money, archaeologists should begin now to include funds for radiocarbon dating. Costs are quite variable, but at the present time a figure of about $100 to $200 per date is a fair estimate of cost.

A committee of the conference participants is exploring the possibility of publishing all dates on punch cards which would be distributed on a subscription basis. The need for such a file is becoming increasingly apparent since dates are now published in a variety of American and European journals.

A very useful "Bibliography of Radiocarbon Dating" was published by Hilde Levi of the Copenhagen Dating Laboratory in *Quaternaria* (1955, Vol. 2, Rome). An annual supplement is in preparation, and archaeologists who have published recent articles having some connection with principles, methods, or results of radiocarbon dating are urged to send titles or reprints to Dr. Levi, 36 Juliane Mariesvej, Copenhagen, Denmark.

EARLY MAN

TEXAS. The discovery of a series of man-made hearths near Lewisville in Denton County was announced in the Notes and News section of this journal last July (Vol. 22, pp. 106-7). These hearths contained the remains of several extinct Pleistocene animals, a wide variety of small animals still living in the area, mussel and snail shells, and hackberry seeds, all in a charred condition. Their geological position is in the Upper Shuler formation, long recognized as probably to be correlated with the latter half of the Wisconsin glacial period. It was also mentioned that a complete Clovis fluted point was found in the largest hearth (now called Hearth No. 1), only 20 inches from a fine specimen of charred wood. Both the point and the charcoal were several inches down in the hearth and were discovered by members of the Dallas Archeological Society while removing the contents of the hearth pit. Several professional archaeologists witnessed these hearths both before and after excavation. Although the discoverers are "amateur archaeologists" they have been conducting field work on a profesional level in this area for many years.

The Notes and News section of this journal last July neglected to mention that the hearths had been discovered in the floor of a large borrow pit, excavated by dragline operation to obtain fill for the Garza — Little Elm Dam. Two or three of the hearths, including No. 1, were exposed on the flat, scraped floor of this borrow pit, while the others were seen in the sides of shallow gulleys eroded in the pit by rains during the last 5 or 6 years. As the dragline operations removed approximately the upper two-thirds of the Upper Shuler formation, the hearths (at least 14 have now been located) all occur in the lowest one-third of this formation, the lowest one being almost on the disconformity which separates the Upper from the Lower Shuler.

The dating of the charred wood from Hearth No. 1, by the radiocarbon laboratory of the Humble Oil and Refining Company in Houston, was the basis for an announcement in *Time* magazine on August 6th that "a

hearth" from this site ("near Dallas") had been dated at 37,000 years. *Time* failed to mention that the age determination was greater than 37,000 years — that is, the actual age of the sample was beyond the range of the laboratory technique — and that this dating was checked with charcoal from a second hearth, with the same result. *Science*, on August 31, 1956 (Vol. 124, No. 3218, pp. 396-7), carried a fuller description of the Lewisville site and these dates under the title of "Oldest Traces of Man in the Americas." In this article it is more or less assumed that a dating of more than 37,000 years can be accepted for the Clovis point. This situation is of great interest to American archaeologists, for it raises numerous possibilities that are difficult to reconcile. As one of the witnesses of these hearths before they were excavated, and as one who recommended certain procedures in excavating them, the writer feels that some comments are in order. Not only has he received numerous inquiries as to his personal opinion of the validity of the discovery and the datings, but more than one persons has openly suggested that the Clovis point may have been "planted" in Hearth No. 1. It should be clearly understood that the members of the Dallas Archeological Society are in no way responsible for the comments that follow. In brief, it appears to me that there are 4 possible explanations:

1. That the dating may be in error. This is unlikely, for the technicians of the Humble Company's radiocarbon laboratory are highly competent and among the leaders in this field; furthermore, the dating was checked on charcoal from 2 different hearths.

2. That the date is correct for the Clovis point at this site. If this is true, we have a chipped stone projectile point in the New World which is at least twice as old as any known from the Old World, and the fluted-point tradition endured in North America for more than 27,000 years, for a dating of about 10,000 years is now generally accepted for the Folsom type. It is probable that the Folsom type had existed for some thousands of years before this date and it is equally probable that the Clovis type came into existence some thousands of years before the Folsom type; neverthless, few if any archeologists would have expected an age of more than 18,000 years at the most for a Clovis point — an age which would be approximately equal to that of the oldest known stone projectile points anywhere in the world.

3. That the Clovis point was "planted" in the hearth. In this case, the members of the Dallas Archeological Society cannot possibly be implicated; their integrity and field methods cannot be questioned. The presence of a Clovis point in Hearth No. 1 was entirely logical, for the Upper Shuler formation provided an expected geological position for such an artifact. Furthermore, when the writer first saw this hearth there was no evidence of surface disturbance; the burned clay as well as the unburned clay around it was packed hard and finely cracked from sun baking.

4. That the dragline operation was in some way responsible. This, too, appears to be impossible because of the infinitely small chance that the dragline could have picked up this specimen elsewhere and deposited it at this spot without breaking it, or that it could have been deposited several inches deep in a hard-packed clay.

The writer cannot presume to conclude which of these alternatives is the correct one. All archaeologists will eagerly await the detailed publication of this momentous discovery by Crook and Harris. One may mention in passing that it also has an important bearing on the "long" and "short" counts for the Wisconsin glacial period as a whole. If it is true that the Wisconsin period began not more than 25,000 or 30,000 years ago, as a large number of radiocarbon datings from Middle Western glacial moraines now appear to indicate, a dating of more than 37,000 years would necessarily be pre-Wisconsin. On the other hand, there seems little reason to doubt that the Lower and Upper Shuler formations should be correlated with Lower and Upper Wisconsin, respectively, on the basis of both geology and associated fauna; and if so, the date of the Lewisville hearths would support the original or "long" count for the Wisconsin period. Correlations between formations in glaciated areas with those in unglaciated areas, however, present many difficulties, and only further study will eventually resolve such questions.

W. W. Crook, Jr., one of the discoverers of the Lewisville site, points out that the Lagow Sand Pit Man, a fossilized partial skeleton found in East Dallas in 1921 by Ellis W. Shuler of Southern Methodist University, was found in a geological formation which can now be determined as precisely identical with that of the Lewisville hearths. It may also be noted that the Lewisville site was a true campsite, yielding far more detailed information about the food habits of early people than the "kill" sites from which most of our previous information has been derived.

Two radiocarbon datings have been obtained by Sellards on the type locality for the Plainview culture complex at Plainview, Texas (E. H. Sellards, A. D. Krieger, G. L. Evans, and G. E. Meade 1947, *Bull. Geol. Soc. of Amer.*, Vol. 58, pp. 927-54). The first is 9170 ± 500 years, obtained by the Lamont Geological Observatory on freshwater snail shells from the bed which contained the fossil bison remains and artifacts, collected by Evans in January, 1953, and kept in dust-prof glass containers. Since the Plainview site is a "pure" one, containing only the Plainview type of projectile point and some plano-convex scrapers, and the extinct bison found there is the same species as that at the Folsom locality in New Mexico, it had been supposed that an unmixed Plainview site should follow closely after Folsom in age. The present dating bears out this expectation.

The second radiocarbon date on the Plainview type site was obtained by the Humble Oil and Refining Company on the organic portions of fossil bison bones. This date is 7100 ± 160 years but the conditions of collecting must be considered. The original excavation by the Texas Memorial Museum took place in 1945 but the present sample was not collected until 1955 and consists of bone fragments which had lain on or near the surface during this time. Sellards states that during these 10 years plant rootlets must have penetrated the ground and bones

extensively, and as rootlets in bone are extremely hard to remove, it is doubtful that this test gives the true age of the sample.

Still another radiocarbon date has been obtained by Sellards on freshwater snail shells from the white sand at the Midland site (see Fred Wendorf, A. D. Krieger, C. C. Albritton, Jr., and T. D. Stewart 1955, *The Midland Discovery*). The white sand at this site lies unconformably beneath the gray sand which contained the human skull but it is thought that no great time lapse occurred between their depositions. This age determination, made by the Lamont laboratory, is 12,500 ± 1200 years, the large margin of error being due to the smallness of the sample. It is appreciably greater than the 8670 ± 600 years obtained by the University of Michigan laboratory on fossil bone from the white sand (see reference above, pp. 9 and 99-100). According to Sellards, the date on snail shells is "not unexpected," both because of the stratigraphic position of the white sand below the gray sand (which is now regarded as approximately of Folsom age), and because of his tentative correlation of the Midland white sand with the lowest cultural level at the Blackwater Draw ("Clovis") site in eastern New Mexico, which contains Clovis points and numerous remains of mammoths and other extinct mammals.

New Mexico. In view of numerous speculations among archaeologists as to the relative value of charred versus uncharred bones in radiocarbon dating, a recent test case made by the Humble Oil and Refining Company laboratory for Sellards is of great interest. Two samples of bone assignable to the Portales culture complex and obtained from the Sanders gravel pit on the Charles Baxter ranch about 7 miles north of Portales, New Mexico, were collected by Sellards and Oscar Shay in November, 1955. The organic portion of uncharred bone produced a date of 6300 ± 150 years, while the organic portion of partially charred bone produced a date of 6230 ± 150 years. The 2 determinations are so close together that it may be said, at least from this test, that it makes no difference whether the bone has been charred or not.

Arizona. Charcoal from the Lehner ranch site, near Hereford in southern Arizona, has been dated in the radiocarbon laboratory of the University of Arizona at approximately 8500 years. This site has yielded the remains of many mammoths and 13 examples of Clovis fluted points in direct association. Emil W. Haury, University of Arizona, has expressed the opinion that this date is much too low for acceptance. Thus, in recent months, archaeologists have reached a strange dilemma regarding the age of Clovis points: at Lewisville, Texas (see above), the radiocarbon dating is far greater than anyone would expect; and at the Lehner ranch it appears to be several thousand years too young. While the writer has heard a number of opinions that these 2 datings only reflect the general inadequacies of the radiocarbon method, it must be admitted that the great majority of such datings are quite consistent among themselves. At this point it would seem that only more datings and more field studies will resolve such divergencies.

Assembled by Alex D. Krieger

ARCTIC

T. P. Bank II is presently in Japan where he is studying North Pacific culture transfers under a Fulbright grant in archaeology and ethnobotany. With the aid of Ainu and Gilyak informants he is comparing American data on Eskimo-Aleut plant lore with similar data relating to the Asiatic aboriginals, and he has a staff of four at work on the translation of Japanese and Russian papers on the Ainu. Recently, at Hokkaido University, he was invited to conduct a series of seminars on American techniques of field archaeology, and this past summer he led a joint Japanese-American expedition to the Okhotsk Sea coast of the island. The results of this are not yet known here, but preliminary information on the area will be of considerable interest to Arctic specialists. Professors Goto and Serizawa, of Meiji University, have a great deal of material from Hokkaido which they claim to be Paleolithic and Mesolithic. Bank does not agree with this identification, but he mentions that certain of the sites have yielded obsidian microliths, burins, cores, and points, while others have produced hand axes. Some of these collections are reminiscent of the Denbigh finds, and the local geologists claim the former are derived from late Pleistocene strata. The major excavation planned for the summer of 1956 involved 2 sites which have proved stratigraphy. One of them has been shown to contain microliths and cores, and Bank believed this might be correlated with pollen analysis. The other is a dry cave which he thought might check back from the Ainu to pre-Ainu period and perhaps tie in at the lowest levels with nearby microlith-bearing strata. Bank comments on the large number of traits which seem to have been shared by the ancient Hokkaido culture and the Aleut culture. Some of the Japanese believe there was a major Ainu-Aleut contact in prehistoric times, but Bank suggests the possibility of a pre-Ainu, strongly Eskimoid, northeast Siberian culture that spread down into Hokkaido via Sakhalin. This thought is similar to the view expressed by Chester Chard at the recent International Congress of Anthropological and Ethnological Sciences in Philadelphia. In the session on the Circumpolar Culture Complex, Chard read a paper in which he advanced the hypothesis that Northwest Coast-northeast Asiatic similarities stemmed from a basic Circumpacific Eskimo culture.

Assembled by Elmer Harp

PACIFIC COAST AND GREAT BASIN

National Park Service. Since the beginning of the 1957 Fiscal Year the National Park Service has executed contracts with the University of Washington and the University of Oregon for continuation of the archaeological salvage surveys and excavations at The Dalles Reservoir area. This summer's work will be the last before the reservoir begins to flood. Arrangements have also been made with the Corps of Engineers for the salvaging of a representative number of the petroglyphs which will be inundated by The Dalles Reservoir.

Contracts under negotiation include one with the State College of Washington for the initiation of salvage exca-

vations at the Ice Harbor Reservoir area, Washington, and one for a continuation of salvage operations at the Monticello Reservoir area, California, which is due to start flooding this winter.

Paul J. F. Schumacher, Archeologist at Independence National Historical Park Project, Philadelphia, has been appointed Archeologist in the Region Four Office in San Francisco.

CALIFORNIA. During June a field party of six under William J. Wallace continued work in Death Valley National Monument. A rock shelter in the Panamint Mountains was excavated, producing a large quantity of artifacts, mostly attributable to recent Shoshoneans. There was some suggestion of an earlier occupation (large projectile points) but no clear cultural stratigraphy.

Salvage operations went on at 3 sites near Laguna Beach, Orange County. This work, carried on by the University of Southern California with the cooperation of local societies — the Archaeological Survey Association of Southern California and the Archaeological Associates — continued until late September.

Mabel V. Harding has been engaged in salvage of several archaeological sites near the San Diego city limits. They represent an early phase of La Jolla II and a late phase of La Jolla I, under related conditions of weathering. The La Jolla II artifacts show a marked similarity to the Sulphur Spring stage of Cochise.

NEVADA. The Western Speleological Institute and the Nevada State Museum continued their investigation of the caves and shores of Lake Lahontan with the close cooperation of Lamont Geological Observatory. The fifth season on the Lahontan project was divided into 2 sections. An early expedition in the spring, which was joined by George F. Carter of The Johns Hopkins University, examined soils and surface sites above the high beach line dated by radiocarbon methods at 11,500 years B.P. The second section followed the Great Basin Conference, with Wallace Broecker and Bruno Giletti of Lamont, and Ray Davis and Oliver Schaefer of Brookhaven National Laboratories, participating. These specialists investigated radiocarbon, tritium, and chlorine dating of the lake and cave sediments in both the Bonneville and Lahontan basins. Additional excavations through the lake sediments of Fishbone, Guano, and Crypt caves by Orr and Calhoun failed to develop evidence of man at an age greater than that of the top of the lake sediments which have been dated at 15,800 B.P. but did produce a radiocarbon date of 3,000 years B.P. for some basketry material. Broecker, Orr, and Kulp field-checked their manuscript covering the radiocarbon history of Lake Lahontan, which deals with the major rises and falls of the lake level during the past 30,000 years.

UTAH. James H. Gunnerson, with a small party, devoted 3 weeks to testing 4 Fremont culture sites in the vicinity of Emery where the University of Utah excavated 2 small Fremont culture sites in the summer of 1955. The sites tested were somewhat larger than the ones excavated then and one of them shows promise of contributing important stratigraphic data and further information about architectural variations. Tentative plans are now being made to return to this area with a summer field school in 1957. Jesse D. Jennings and James H. Gunnerson spent several days in the vicinity of Elk Ridge, San Juan County checking several large sites that had been reported to the University by Richard Lewis of the U.S. Geological Survey. Sites in this area are numerous and are apparently of Pueblo II age.

The Great Basin Archeological Conference met on the University of Utah campus on August 19-21. Attendance was excellent and the conference was very successful. Fay-Cooper Cole served as Conference Chairman. Plans are underway to publish papers presented at the conference.

WASHINGTON. Field work in archaeology by the Department of Anthropology, University of Washington, and the Washington State Museum has been rather extensive in the State of Washington and adjacent areas this past summer. In all, 5 field excavations have taken place; 4 of these are large, long-range field programs.

Contacts made early last year resulted in the setting aside by the Washington Water Power of some $7500 for archaeological work in their Mt. Sheep and Pleasant Valley Reservoirs on the Snake River below Hells Canyon. This area was surveyed during the fall of 1955 by George Coale. This past summer, Coale took to the field with a crew of seven and worked through June, July, and part of August, excavating both house pits and burial sites in these 2 reservoirs.

The University has cooperated with the Smithsonian Institution in the Hells Canyon excavations. This work was led by Warren Caldwell who was in the field from late June until late August when he left to take a position in Nebraska with the River Basin Surveys Missouri Project. Coale supervised the rest of the Hells Canyon work. It appears that the region will be in many aspects quite different from the classic Plateau. Relationships with the Great Basin and the larger Desert culture area to the south are anticipated.

Work was continued at the Wakemap Mound near The Dalles, Oregon, Washington side. The archaeological work in the area has been under the direction of Robert Butler, and under the administrative direction of Edward Larrabee. The almost chance discovery of some undisturbed cremation pits in the Spedis Valley adjacent to Wakemap Mound has given a glimpse of aspects of aboriginal culture history previously quite unknown. The result is that a large share of the report will be taken up with a study of art and bone carvings. These were fragmented during the firing but the calcined antler and bone have retained enough of their original characteristics so that it will be possible to work out a study of a classical art which was previously only suspected.

The University of Washington has cooperated closely with Jesse Nusbaum of the National Park Service in the pipe-line activities in the Pacific Northwest. University of Washington graduate students have formed the main core of pipe-liners. Four sites have been

rather intensively investigated, one in Oregon and three in Washington. The initiation of work on the low Priest Rapids Dam on the Columbia south of Vantage, Washington, has opened yet another reservoir for local archaeological investigations. A site, fortunately one of little value, lay athwart the axis of the dam. This was investigated thanks to an allocation of funds by the Grant County Public Utility District. These 5 field parties were organized and local arrangements made by Douglas Osborne.

A step has been taken which will have no small effect on future archaeological activity in Washington; the Washington Archaeological Society was organized during the summer. It is presently composed of a hard core of deeply interested amateurs all of whom have interests of a professional level in archaeology. The group plans on doing survey work within the State, mapping and grading collections and, further, settling down on a site of value and working it thoroughly. Profesional supervision will be available for all of the actvities of the Washington Archaeological Society.

BRITISH COLUMBIA. Assisted by grants from the University of British Columbia Committee on Research and the Leo and Thea Koerner Foundation, Carl Borden and Jim Baldwin conducted surveys along the Lower Fraser and on some of the islands in the Gulf of Georgia. A few of the findings, they believe, will be of considerable significance. Some time ago, A. C. Milliken, a resident of Yale, reported the discovery of an old site a few miles north of Yale, exposed by work on the Canadian National Railroad right of way. Results of a brief preliminary investigation suggest that the site has indeed a long history. The railway cut reveals at least 6 distinct occupation horizons, separated by thick strata of sand and gravel, some of the latter cemented into solid rock. The lowest occupation level is 16 feel below the present surface. The next oldest, at a depth of 12 feet, yielded numerous chips and a considerable amount of charcoal. The uppermost deposit, from 2 to 3 feet in thickness, contains the cultural remains of the recent Upper Stalo Indians. The sands and gravels underlying the recent deposit were presumably laid down by the Fraser, whose present high-water level is some 40 feet below the lowest alluvial stratum of the site. Geological studies of the site are planned for the fall.

Further indications of long human occupation were found at other sites along the river between Yale and Hope. At the large pit-house village site at Hope it was determined that the cultural deposit extends uninterruptedly down to a maximum depth of at least 7 feet. The artifact content of many of these Fraser River sites is high and intensive work in this region promises to shed light on the history of wood working and related problems.

It is hoped that one of the results of the Gulf Islands survey will be the discovery of sites which may add to the knowledge of the Early Maritime culture which is known at present only from 2 Fraser delta sites, both of which have been obliterated since they were first investigated.

Assembled by R. D. DAUGHERTY

SOUTHWEST

PECOS CONFERENCE. The 1956 session was held at the Museum of Northern Arizona in Flagstaff, August 16, 17, and 18. The opening meeting was devoted to archaeological reports of the summer's field work; Raymond H. Thompson of the University of Arizona acted as chairman.

Richard Shutler, in charge of the summer archaeological work in the Lake Mead National Recreation area, said that, besides work on the survey material already collected, paleoclimate is being studied from pollen samples taken from local caves. It is hoped that a long climatic sequence may be developed from this study.

Shutler also made an archaeological survey which revealed a 21-room masonry pueblo on the Shivwits Plateau, occupied from the middle of Pueblo II up to around A.D. 1150. A 4-room shelter found on the Grand Canyon terrace yielded petroglyphs, sandals, and cordage.

Robert C. Euler's work with Henry F. Dobyns on the Walapai Reservation resulted in the excavation of 2 rock shelters. They found brown pottery which they have correlated with the historic Walapai pottery. This work is being done in connection with Walapai and Yavapai land claims cases.

David A. Breternitz, Archaeologist of the Museum of Northern Arizona, excavated pit houses in 4 sites of the period before the eruption of Sunset Crater; all conform to previously recognized Pueblo I and Pueblo II house types. Unexpectedly parts of 2 irrigation canals were found running close to two of the excavated pit houses. These canals help explain the finding of villages far from any known prehistoric sources of water. Breternitz also reported that the Tully Thomas collection of preceramic material from the Concho area of the Little Colorado River has been deposited at the Museum.

William J. Beeson, graduate student of the University of Arizona, has been making an archaeological survey of the Zuni River country in Arizona and the upper Little Colorado drainage. He has found 250 sites in this region, from Basketmaker III to Pueblo IV. The number of sites and possibly the population gradually decreased from Pueblo II to Pueblo IV.

In Tucson the Peabody Museum West of the Pecos has been officially established as a section of Peabody Museum of Harvard University, as a research laboratory. Its major current activity is the analysis of the vast pottery collection made by the Peabody Museum Awatovi Expedition of 1935-39. Originally undertaken by Mrs. H. S. Cosgrove, but for some time held in abeyance, the study of the Awatovi ceramics is now proceeding at the Tucson laboratory under the direction of Watson Smith, assisted by Robert F. Burgh and James C. Gifford, and under the general supervision of J. O. Brew, Director of the parent Peabody Museum.

The work of the University of Arizona at Point of Pines was reported by Raymond H. Thompson, Assistant Director of the field school. Five sites were excavated or tested in the general Point of Pines area. The preceramic Cienega site produced evidence of basket cre-

mations in the large cremation pit partially excavated last year. Radiocarbon dates for this site range from 3000 to 4200 B.P. Excavations were continued in the large Pueblo III-IV ruin, and a circular kiva, perhaps dating as early as the 1200's, was excavated; its floor lies about 13 feet below the present surface. The kiva was covered by 14th and 15th century trash and walls. The burnt section of the pueblo, which was built by immigrants from the Kayenta region, was partially outlined and more rooms were excavated, one of which proved to have been a corn storage room with masses of charred corn intact on a wood floor. Three other sites were partially tested in an unsuccessful search for sites dating between A.D. 500 and 800.

Charles C. Di Peso of the Amerind Foundation excavated a pueblo on the San Pedro River in the vicinity of Redington, Arizona. Masonry-walled rooms surrounded a plaza, and a stone wall surrounded the whole village. In its masonry the pueblo was more like sites farther north than southern Arizona compound pueblos. The painted wares found were Gila, Tonto, and Tucson polychromes.

A. H. Schroeder reported on the National Park Service survey in Gila County. Ninety-eight sites were recorded, 15% of which were Hohokam; the sites range in time of occupation from A.D. 600 into the 1300's.

William Wasley, Archaeologist at the Arizona State Museum, spoke on the organizational work necessary before state and county highway departments begin to cooperate with archaeologists. He also reported that the archaeological material from the Kinishba Museum has been moved to the Arizona Museum for protection; the museum at Kinishba no longer has a custodian.

Joe Ben Wheat of the University of Colorado excavated portions of a Basketmaker III site in Yellowjacket, Colorado. He uncovered a house and antechamber much larger than the average pit house in the village, as well as more normal-sized pit houses and surface storage rooms.

Stewart Peckham, highway salvage archaeologist with the Museum of New Mexico, excavated 12 sites during the past year, including 3 Pueblo I pit houses and a remodeled Mesa Verde ruin on the San Juan, a Clovis site, and some sites in the Reserve River area, in the Jicarilla Reservation, in the proposed Navaho Dam area, at Kirtland on the San Juan River, and in the Sacramento Mountains. The highway salvage program in New Mexico is well organized and occupies the full attention of one archaeologist and the cooperation of other archaeologists in the state.

The second session of the Pecos Conference was divided into 2 parts — a linguistic session, the first to be held at a Pecos Conference, and a session on early man, under the chairmanship of E. B. Sayles of the Arizona State Museum. The early man reports concerned the work done in 1956. David Breternitz spoke on a nonceramic site in the Grand Canyon area. William Wasley showed slides of the Lehner mammoth kill site, where not only 13 Clovis fluted points and 9 cutting and scraping tools, but also hearths and the bones of 9 young mammoth, bison, late Pleistocene horse, and possibly tapir have been found. It is of interest that both the Lehner and Naco sites suggest that in the New World the hunters ate the butchered meat on the spot of their kill, unlike the usual custom in the Old World. Douglas W. Schwartz reported radiocarbon dates of roughly 2500 B.P. on split-twig figurines found in dry caves in Grand Canyon. Richard Shutler told of results on the Stewart Rock Shelter in southern Nevada. Test trenches through debris produced 4 cultural levels, with Paiute and Pueblo material mixed on the top, Pueblo material on the second level, Basketmaker III material on the third, and nonceramic material on the fourth. Radiocarbon dates from 2 hearths in the lowest level were roughly 4000 B.P.

In its final session the Conference discussed the archaeological picture of the Southwest from A.D. 1100 to 1300. The discussion was divided into the major river drainages, and archaeologists familiar with particular drainages spoke of the over-all picture of those areas. Douglas W. Schwartz, of the University of Kentucky, was chairman of the session. The period discussed was one of crowding together of the Puebloans into large and often defensively located pueblos, of large-scale movements of people, and of the abandonment of large sections of the Southwest previously occupied by pueblo builders.

The Southwestern Monuments Division of the National Park Service at Gila Pueblo at Globe has extended an invitation to the Conference for the 1957 meeting. The interim committee includes A. H. Schroeder, chairman, Raymond H. Thompson, and Bruce Ellis.

Assembled by E. B. DANSON

PLAINS

ALBERTA. The archaeological project begun in 1955 by H. M. Wormington under the auspices of the Glenbow Foundation of Calgary continued in 1956 from mid-June until the end of August. Wormington and E. Mott Davis were in the field with a party of 6 persons. The season was spent in intensive testing of sites, reconnaissance, and recording of collections in 3 areas of central and northern Alberta, regions hitherto untouched by archaeological excavation. In central Alberta, surface hunters have found many Middle Horizon ("Archaic" in the eastern U.S. sense) and Late Horizon points in sand ridge blowouts, and a number of these blowouts were tested 30 miles southwest of Edmonton near Stony Plain, and 50 miles northeast of Edmonton near Redwater. At the Sekirsky site, 8 miles east of Redwater, small stemmed points and sherds of a poorly finished smoothed type were found just below the plow zone. Elsewhere in the blowouts cultural material was scattered and infrequent but there was some occupational stratification, and the indications are that a good historical picture can be obtained by extensive exploration with the aid of machinery.

In the Peace River country of northern Alberta, farmers for years have been plowing up points of many styles, including specimens resembling such early types as Scotts-

bluff, Angostura, and Browns Valley. Numerous tests were made at spots where such finds have been made, but in each case the occupational evidences turned out to have been in the plow zone, which overlies sterile glacial deposits, and the site had been destroyed by cultivation. Undisturbed sites appear to occur mainly in the steep uncultivated land along the streams of this region. One such site was tested, the Macrory site, a small workship and lookout station 3 miles north of the town of Peace River. It appears to be relatively recent. On the basis of point types found in the Peace River region, it seems very likely that continued checking of the valley fill exposures of this area will eventually turn up sites that will yield information about early migrations from the North.

A great deal of valuable data on artifact types and their distribution were obtained through examination of the collections of farmers and amateurs. Because of the summer's work, many local people have been put on the lookout for undisturbed sites. Ernest Reinhold of the Modern Languages Department of the University of Alberta at Edmonton, a member of the 1956 field party, is prepared to photograph specimens and coordinate information sent in by interested persons in the province. With the setting up of this information center, and with publication of Wormington's report on the 1955 and 1956 field sessions, expected for the Spring of 1957, a good foundation will have been laid for continuing research in Alberta archaeology.

The famous K. F. Harris Jones collection from Mortlach, Saskatchewan, is now housed at the Glenbow Foundation in Calgary, where a complete analysis of the material is planned.

North and South Dakota. The field season of 1956 was a busy one along the Missouri River, especially in the 250-mile-long Oahe Reservoir area which reaches most of the way from Pierre, S.D., upstream to Bismarck, N.D. The River Basin Surveys of the Smithsonian Institution sent 4 field parties to Oahe from its field office at Lincoln, Nebraska, and 3 state institutions also had parties in the reservoir area working under cooperative agreements with the National Park Service as part of the Inter-Agency Salvage Program.

The State Historical Society of North Dakota, cooperating with the National Park Service, had a party of nine in the field from mid-June to September 1, with Alan R. Woolworth and W. Raymond Wood in charge, and Frederic Hadleigh-West as assistant. Most of the season was spent at the Demery site, 39CO1, in northern South Dakota. Four circular houses were excavated completely, a fifth was cross-sectioned, and many borrow pits and exterior cache pits were dug. The Demery site pottery resembles that from the La Roche site in South Dakota. This is the farthest northward extension of the La Roche ceramic complex. The field party also carried on extensive testing in sites along the Missouri in North Dakota from the state line to the Cannonball River.

A 12-man field party of the University of Wisconsin, cooperating with the National Park Service, conducted excavations during July and August in 4 sites in the vicinity of Mobridge, S.D. David A. Barreis was in charge, with John Dallman as field foreman. Earth-moving machinery was used extensively in removal of overburden and cutting profiles in deep refuse deposits. More than half the time was spent at the Eklo-Spiry site, 39WW3, just south of Mobridge, where 2 circular houses, 11 burials, and many storage pits were dug, and middens were tested. This site contains abundant White trade material. The Spiry site, 39WW10, about ¼ mile southeast of Eklo-Spiry, was found to contain a prehistoric La Roche component. At the Bamble site, 39CA6, 6 miles north of Mobridge, 4 houses, a fortification ditch, and midden areas were tested, and a good deal of trade material was recovered. A small test was made near by at the Kvamme site, 39CA9. Barreis points out that the Mobridge area is an excellent one for applying archaeological, ethnological, and ethnohistorical evidence in the study of local culture history.

The Baumen Archaeological Project of the Museum of the University of South Dakota, sponsored also by the South Dakota Archaeological Commission and the National Park Service, worked for 7 weeks at 2 sites south of Mobridge. Roscoe Wilmeth was in charge, with Vince Penning as field foreman. Work was completed at Swan Creek, 39WW7, which has been under investigation for several years, and major excavations were carried on at the Payne site, 39WW302. Swan Creek has 2 components related to La Roche and Rygh. The Payne site contains only the La Roche-like material (Moreau focus), and work there helps clear up some of the problems of the earlier occupation at Swan Creek.

Waldo R. Wedel, assisted by George Metcalf, spent 10 weeks at the Cheyenne River site, 39ST1, just below the mouth of the Cheyenne, with a River Basin Surveys party of 10 men. This was the final season at this 3-component site, described in "Notes and News" last April. A large burial area, probably of the most recent ocupation, was investigated, and a stockade was found which seems to belong to one of the earlier components.

Carl F. Miller and a River Basin Surveys party worked for 8 weeks at the Hosterman site near Whitlock's Crossing, S.D. This appears to be a single-component site with a stockade of a double row of posts, houses which were difficult to outline and many cache pits. The occupation appears to have been relatively brief.

One of the largest sites known on the Missouri River is the Sully site in the Oahe Reservoir area, about 20 miles above Pierre. This site measures some 4000 feet by 1500 feet and appears to contain about 400 houses. A River Basin Surveys party of 12 men directed by Robert L. Stephenson worked here for 6 weeks doing preliminary excavation, preparatory to a major season in 1957. The site was mapped, test pits were dug every 100 feet, 2 test trenches were dug, and one quadrant of a house was excavated. There are at least 2 burial areas in the site, many cache pits, and at least 2 large ceremonial structures. Artifacts are abundant. Stratigraphic and typological evidence indicates 3 and perhaps 4 occupations.

G. Hubert Smith worked for 9 weeks with a River Basin Surveys party of 6 men at a historic trading post site near the Oahe Dam. This site is thought to be Fort

Pierre II, dating about 1860-1862. A stockade, a warehouse, a cellar, and a dwelling were excavated, and a great many historic artifacts were found.

The section of the Missouri River below the Oahe Dam, between it and the upper reaches of the Fort Randall Reservoir, is to be flooded by the Big Bend Reservoir. A River Basin Surveys party of 3 men, directed by Harold Huscher, made a 14-week intensive survey of this reservoir area from June to September, recording over 225 sites and testing most of them. Many of the sites are large and productive. Historic sites include several American military posts and a possible Spanish post. At the end of the field season this party moved downstream to the Fort Randall Reservoir area and excavated a burial area near the Oldham site.

NEBRASKA. A 6-man field party of the Nebraska State Historical Society, directed by Marvin F. Kivett, spent 7 weeks in June and July excavating at the site of Fort Atkinson, a very early American military post east of present-day Fort Calhoun in Washington County just north of Omaha. Fort Atkinson was active between 1820 and 1827 and was the focal point of the fur trade during that period. The Indian agent was stationed there, and several important treaties were completed in the fort. Earlier, this was the site of Lewis and Clark's Council Bluff. The site now is in danger of destruction by expansion of the city of Omaha, and Kivett's work was aimed toward making recommendations for the preservation of the site. Army records which have been examined do not indicate the extent or exact location of the structures, and although they mention the high death rate among personnel during the early years of the fort, the location of the cemetery has not been known. Kivett's work located a series of pits dug for garbage disposal, 4 building sites one of which was within the fortified part of the fort, and the cemetery. Most of the tombstones have disintegrated, but a tombstone previously found bore the name of Lt. Gabriel Field of the 6th Infantry Regiment. The grave under this stone was found to be empty, and it appears that Lt. Field's remains may have been moved many years ago. Kivett would welcome any information relating to Lt. Field or to Fort Atkinson. Further excavations are under consideration for the site.

The Summer Field School of the Department of Anthropology, University of Nebraska, directed by Franklin Fenenga, spent 8 weeks from June to early August at the Sterns Creek (Walker Gilmore) site, 25CC28, on the western side of the Missouri River valley due east of Lincoln. Fenenga found stratigraphic evidence for a sequence of Woodland occupations, as well as occupation materials both earlier and later than Woodland.

KANSAS. In the Lovewell Reservoir area on White Rock Creek in Jewell County, north central Kansas, a River Basin Surveys party of 8 men, directed by Robert W. Neuman, dug in 4 sites, three of which — 14JW1, 14JW2, and 14JW202 — appear to be occupation sites of the White Rock focus, a little-known late prehistoric complex of Kansas and Nebraska. The sites are characterized, here as elsewhere, by relatively large extent and small cultural content. The type of structure is not clear. The fourth site, 14JW207, was a mound much disturbed by pot hunters. Enough material was recovered, including fragments of human skeletons, to identify the site as a Woodland burial mound. No further work is contemplated for the Lovewell Reservoir area.

In the Toronto Reservoir area in east-central Kansas, Alfred Johnson and a River Basin Surveys party of 3 men began salvage work in mid-August.

TEXAS. Major field news from Texas is the 37,000-plus radiocarbon date from a site near Lewisville, northwest of Dallas, which is discussed in the Early Man section. The Austin office of the River Basin Surveys has been reactivated after having been closed for 2 years, and Edward B. Jelks has been carrying on salvage archaeology in the McGee Bend Reservoir area on the Angelina River in East Texas. Alex D. Krieger has left his position as Research Scientist in the Department of Anthropology at the University of Texas to take the Directorship of the Riverside Municipal Museum at Riverside, California, and E. Mott Davis has been appointed to take his place. Fred Wendorf has joined the staff of Texas Technological College at Lubbock.

Assembled by E. MOTT DAVIS

NORTHERN MISSISSIPPI VALLEY

ILLINOIS. Field work by the University of Illinois under the direction of John C. Mc.Gregor was conducted this summer near Hull. An attempt was made to define the chronological position of Black Sand, since quite a few sherds of this type were found there in previous surveys and tests. Although one site was dug extensively and 3 others were tested, no indication was found that Black Sand occupied any precise chronological position, since sherds of this sort were found throughout deposits and not localized. Therefore, the validity of Black Sand as a distinct cultural unit is now being questioned.

The main work was done on a site with 3 to 4 feet of stratigraphy, undisturbed, and rich enough to give worthwhile results. Definitely Woodland, it is contemporary with Hopewell of the Illinois River valley, but in many ways quite different from it. Human figurines, for instance, have tall, pointed heads, and are crudely made compared to typical Hopewell figurines. Several burials were uncovered, and a large sample of sherds and chipped stone artifacts was found. In the rather widefung tests made in this village no evidence of a house or other specific structure was located, though one circular clay floor some 5 or 6 feet in diameter was uncovered. In general, the cultural attainments of these people were of a somewhat lower level, at least artistically, than those of typical Hopewell people of the Illinois Valley. Although preliminary study has been completed, much still remains to be done with the finds before any report may be undertaken.

The Illinois State Museum's 1956 Archaeological Field Party under the direction of Melvin L. Fowler, excavated at the Modoc Rock Shelter. Excavations were conducted in an area about 150 feet north of the previous excavation. This change was made necessary due to a legal dispute

over the ownership of the main site. An area 20 by 25 feet was excavated through Zones I, II, and III. The artifacts found confirmed the sequence of Zones II and III previously reported on. In Zone I several Dalton points were found, a type not previously reported from the site. A much more complete assemblage from Zone I was obtained. At the depth of 21 feet below the original ground surface, a group of 5 complete burials were discovered. These were in a level that was radiocarbon dated around 6200 B.C. in the previous excavations of the main site. Adequate charcoal samples were collected from the 1956 work for dating and will be submitted to laboratories for assay in the near future. Another unusual aspect of the summer's finds were several grinding stones or mortars found in Zone II of the site. A complete full-grooved axe was found at the 18-foot level.

The Illinois Archaeological Survey, under the presidency of John C. Mc.Gregor, is tabulating all of the site surveys of the state. This work is being aided by a grant from the University of Illinois. The major concerns of the Illinois Archaeological Survey are recording of aboriginal sites and aiding in supervision of the highway salvage program in the state. This salvage program has been recently given a boost by the state highway department, which has agreed to cooperate fully and to make the salvage of significant sites within the rights of way of new construction a part of every road building project.

INDIANA. Glenn A. Black, of the Indiana Historical Society and Indiana University, has been on leave of absence from teaching since June 1 and, as a result, no field work was conducted at Angel Mounds this past summer. He will not return until February, 1957. The removal of several hundred thousand yards of earth at a new Alcoa plant site was watched by the Society in the hope of something archaeological being exposed, but nothing resulted. At the present time the Society is attempting to work out an arrangement with the Indiana State Highway Commission to salvage any archaeological material which may be involved in the construction of about 1100 miles of Indiana highways.

IOWA. The Department of Anthropology of the State University of Iowa returned to the Mill Creek site near Cherokee for a second season with remarkable results. Nothing specticular was uncovered but the material was impressive in terms of quantity and quality. Excavation of a house was begun but the job was too large to complete in one season. The department hopes to return next year. The house will probably measure around 30 by 40 feet. Another stratigraphic trench was excavated and the bottom of a mound found. The mound averages about 8 feet in height. Results of the 1955 season were confirmed by the material from this year. Last year over 35,000 sherds were recovered and this year even more. A master's thesis has been written at the university on the sherd material; publication is expected soon in *The Journal of the Iowa Archaeological Society*. Most of the resemblances of Mill Creek material are with material from the Central Missouri Valley. It seems quite clear that the Mill Creek manifestation is part of a larger cultural complex. Activities in the lab last spring were devoted to analyzing Mill Creek material and to clearing the Turin skeletons from the blocks of loess. One skeleton will be submitted early this fall to the Michigan lab for radiocarbon dating.

Another project in the department of anthropology of considerable interest is the analysis of the nitrogen content of bone. Results so far are impressive but more material of known date and a great many more determinations are needed before any certainty can be had that the method will work.

MISSOURI. This past season the University of Missouri conducted excavations in 3 sections of the state: the Table Rock Reservoir area in southwestern Missouri, centrally located Callaway County, and Ste. Genevieve County, in the eastern part of the state about 65 miles south of St. Louis. At Table Rock 2 field parties, one concentrating on shelter sites and the other on open terrace sites, were in operation throughout the summer. The excavation of 4 shelters was completed and investigation begun in 2 others. True stratification, in which sterile layers separated cultural layers, was found at one shelter and much information was obtained concerning at least 4 different Indian occupations in this area. Seven terrace sites were tested with a small ditch-digger and follow-up excavations were made on areas of concentration and features located with the ditch-digger. Most important of these was a burned house of Mississippi provenience. It was possible to reconstruct the house and a model of it was made and put on display at the State Fair at Sedalia. The utilization of the ditch-digger for testing purposes has not only proved satisfactory for salvage archaeology but has also proved a time and labor saver on large terrace sites. Carl Chapman, Robert T. Bray, and Richard A. Marshall of the anthropology department supervised the excavations in Table Rock which were made possible by a grant from the National Park Service. A new grant, obtained from the Park Service in August, will permit the salvage work to continue throughout the year.

J. Mett Shippee, Associate in Archaeological Research, conducted a survey of Audrain County and resumed excavations in a cave in Callaway County. This work was carried on throughout the summer, except for 2 weeks in August when Shippee superintended the archaeological exhibits at the State Fair. Several significant items were discovered during the excavation of the cave, the most significant being atlatl hooks associated with spear points in the lower levels of the cave deposit. This work is being carried on in part through a grant by the Missouri Archaeological Society and with the aid of Society members.

The Tenth Field Session in Midwestern Archaeology at the University of Missouri was held near St. Marys, St. Genevieve County, where a linear mound was excavated. The excavation, supervised by Richard O. Keslin, Director of the Museum of Anthropology, disclosed an ossuary in the center of the mound which contained the skeletal remains of over 25 individuals. All were secondary interments and no grave goods were in association, although pottery and projectile points as well as adequate samples of charcoal were present in the mound fill. The

pottery, even though it has not been completely worked up, has been tentatively identified as Baytown. Analysis of the charcoal should be quite helpful in establishing the temporal limits of this pottery type.

The Missouri Archaeological Society again sponsored Archaeological Exhibits at the State Fair, offering prizes for the best exhibits. The first prize, a membership in the Society for American Archaeology, was awarded to Robert Seelen of Sedalia.

OHIO. The joint summer field course of the Ohio State Museum and Ohio State University, directed by Raymond S. Baby, excavated a small Adena mound site in the Circleville area between June 18 and July 25. Explorations revealed 4 extended inhumations in a shallow, subrectangular depression in the center of a house floor. Fragmentary remains of an additional 4 individuals and cultural material were recovered from the dark fill in a kidney-shaped pit dug in the bottom of the depression. The house pattern, measuring 26 by 22 feet, was elliptical in shape and made up of 25 single postmolds. Three interior postmolds were found at the edge and in the central burial feature. The simple house pattern and burial complex, and the moderately thick, coarsely tempered pottery suggest that the site represents an early phase of the Adena culture. At the conclusion of the field session, several days were spent recovering Hopewellian camp or village debris found on a narrow bench just below the top of a promontory bordering the west side of the Scioto Valley. Several classic, crosshatched, rocker-stamped sherds were found along with other cultural material. The rest of the summer was devoted to survey in highway salvage areas and processing material from the earlier part of the season.

WISCONSIN. Warren L. Wittry of the State Historical Society was in the field 2 weeks this season. One week a rock shelter in Governor Dodge State Park was tested. Middle Woodland materials were found down to a depth of 20 feet and below that the "Side-notched Archaic" down to a depth of 60 feet. There were parallel-sided stemmed points at the same depths as the side-notched points. This work was under the auspices of the Wisconsin Archaeological Survey. The second week, with a crew of four, Wittry investigated a site that is thought to be Ouestatinong, the 17th century Fox Indian village where Father Allouez established the Mission of St. Mark. Nothing decisive was found, but on the last day a line of postmolds was uncovered which appeared to be part of a wigwam or bark cabin. This is the first evidence of prehistoric houses found in Wisconsin outside of Aztalan.

The restoration of Aztalan is proceeding. Stakes were set on September 17 for the restoration of 700 feet of the stockade. This site is a state park and the restoration is being done by the Wisconsin Conservation Department, under the advice of the Wisconsin Archaeological Survey.

For next summer, a rather large project is being planned at a rock shelter in central Sauk County. This site was tested last summer and occupational evidence was found to a depth of 7½ feet.

In the month of June David A. Baerreis led a series of week-end trips with students from the Department of Sociology and Anthropology of the University of Wisconsin, to conduct salvage operations at a late Middle Woodland village site in the Nelson Dewey State Park near Cassville. The site, threatened with destruction by a dredging operation, was thought particularly important because of the paucity of data on village materials from this horizon in Wisconsin. An adequate ceramic series was obtained as well as abundant bone and shell refuse that will throw much light on the local economy.

Assembled by MELVIN F. FOWLER

NORTHEAST

ONTARIO. Full-scale excavations were carried out during the1956 field season at the Rice Lake Serpent Mounds site in Peterborough County. The archaeological area is included in a new Serpent Mounds Provincial Park. William R. Adams headed the party during 9 weeks of excavation in the "head" of the serpent, one of 8 mounds forming the group. Evidence of previous excavations was encountered along with 6 undisturbed burials in and under the mound. Grave goods included beaver incisors, projectile points, copper, silver, and shell beads, but little pottery. This work is part of a 5 year project carried out under the auspices of the Royal Ontario Museum in cooperation with the Ontario Department of Lands and Forests. It is being financed by the Serpent Mounds Foundation of Peterborough.

CONNECTICUT. The Archeological Society of Connecticut has embarked upon a program to bring the publication of their bulletins up to date. Irving Rouse, the acting editor of the society, reports plans for Bulletins 28 and 29 have been formulated.

MAINE. During July, 1956, a party under the direction of Douglas S. Byers made excavations in a site on Pond Island, Blue Hiill Bay (44° 13′ 10″ N., 68° 28′ 45″ W.). This is one of 3 islands with identical names within a radius of 25 miles of Bass Harbor Head. The site, on the south side of the island, is now a field more than 250 yards long in which there are numbers of discrete deposits of shells. Several other deposits are also found at some distance to the east, beyond an alder swamp. Terrace-like areas seem to be associated with each shell deposit. Preliminary tests suggested the possibility that house pits or foundations might be represented, but excavations failed to uncover indisputable evidence locating specifically any form of dwelling. Instead, the deposits of shells seem to have been formed by refuse thrown from a house placed each year in the same general location. No deep burned areas or ash beds were found, and there is, therefore, no indication that people returned to a precise spot each season. A rough examination of sherds suggests that a number of varieties of pottery is represented — possibly a series of some chronological depth. Some of the styles have been made known by the work of Moorehead, Willoughby, Smith, Hadlock, and others. Still other sherds seem to represent new combinations of traits of design and ornamentation. A number of samples of charcoal were obtained, and these should serve to date the

varieties of pottery with which they were associated. Cursory examination of faunal remains indicates that the people lived chiefly on products of the sea. However, they seem not to have taken porpoises, blackfish, swordfish, or other large creatures, but to have lived on clams, sea urchins, sculpins, sturgeon, and other fish, as well as birds, seals, probably of 2 species, and a scattering of land mammals of a number of species. The artifact inventory is very poor. A few pieces of chipped stone were found, and 3 polished stone tools. While the chipped implements were found chiefly in the lower levels, bone points, usually of simple form, were more plentiful in the upper levels. This suggests that the Indians of this region used bone points to arm their weapons, as Brereton has stated.

Theodore L. Stoddard has prepared a preliminary report on excavations in a stratified shellheap on Passamaquoddy Bay. This will form a part of a comprehensive report on the archaeology of that area based on studies of materials collected and excavated over a period of several years. A report on exploratory excavations at a site near Richibucto, New Brunswick, and a descriptive catalog of some pottery from Maine have also been prepared for publication.

Massachusetts. A celt in its original wooden haft is now in the custody of Maurice Robbins, of Attleboro. Mr. Magarida, a fisherman, dug this from the flats of one of the islands, presumably Penikese Island, forming the Elizabeth chain off Buzzards Bay. The specimen is described as being in excellent condition. The haft, originally about 27 inches long, is of oak. The celt is mounted in a tapered hole through a bulge in the handle. It was evidently secured in place by pitch. Added interest in this specimen lies in the fact that it is almost an exact duplicate of the hafted celt illustrated in Willoughby's *Antiquities of the New England Indians* (Fig. 76, p. 143). The illustrated specimen, now in the Museum of the American Indian, Heye Foundation (Cat. No. 11/647) was "found by Augustus S. Backus in 1898 on the shore of his property located on Brandt Island Road on the shore of Buzzards Bay, in Mattapoisett, Plymouth County, just over the Fairhaven line, Massachusetts." Similar celts have been found in other parts of the New World, even as far distant as the Bahamas.

The Cohannet Chapter of the Massachusetts Archaeological Society continued its work at the Wapanucket site on Assawompsett Lake in Middleboro during the recent season. A number of lodge floors were found on a level area about 400 feet from the shore of the lake on what was the highest level about the lake on the north. These appear to be approximately 27 to 30 feet in diameter, nearly round, but with the walls overlapping or by-passing each other to form a protected doorway. In the 2 floors which have been completed this doorway faces away from the lake. Approximately 400 artifacts have been recovered. These include projectile points, knives, pestles, gouges, plummets, atlatl weights, and large and small scrapers, as well as a variety of roughly made tools of unknown use. Maurice Robbins reports that the chapter will probably spend another season on this particular part of the site before they can verify their present conclusions as to the cultural periods represented.

New York. The excavation program of the New York State Museum and Science Service was centered during the summer of 1956 on eastern Long Island, where 3 sites of Archaic cultures, ranging from Early to Late in the period, were explored in advance of destruction by building activities. Since the Archaic is the least-known archaeological horizon on Long Island, the considerable body of data secured is especially useful. William A. Ritchie was in charge of the group of 5 students who participated. Some of this work was financed by a donation from Ward Melville, Stony Brook, New York. Most extensively investigated was a large, deep, stratified habitation site near Stony Brook on the north shore of the Island. This had been partially excavated during the previous season by Ritchie and 2 assistants. Shell middens, pits, hearths (some yielding datable charcoal), and other features found here represented 2 principal periods of occupation, the first by a Middle Archaic group, identifiable with the Laurentian tradition in inland New York; the second by a group which Ritchie has designated Late Archaic. The industrial remains of the latter group link them with the Orient burial complex in the extreme eastern portions of the Island. This late Archaic occupation is therefore considered to be transitional into Early Woodland. This is the first systematic excavation of an Orient habitation site and one of the very few sites in Coastal New York for which reliable information is yet available.

Near Wading River, also on the north shore, an apparently still earlier Archaic component was investigated. Here, as at Stony Brook, the midden consisted mainly of shellfish remains but with more frequently interspersed deer bones. The slender, stemmed projectile points from this site have their closest counterparts in the Lamoka culture of central and western New York, as well as in the lowest levels of certain stratified sites in the Hudson Valley, recently excavated by the State Museum. Evidence is thus accumulating for a broad range of occupation on the Lamoka time level.

Some additional light on the intriguing complexities of the Early Woodland burial cult, as practiced by people of the Orient culture on eastern Long Island, was obtained by the party's exploration of undug portions of the Sugar Loaf site in the Shinnecock Hills, on the south shore. A pit feature, presumably a grave from which the burial had completely decayed, produced an instructive assemblage of goods, comprising a "killed" steatite pot, a celt, stone-working and fire-making tools and 2 small heaps of projectile points of the diagnostic "fishtail" form. Some of the unusual material may aid in tracing the mainland connections of the Orient people. An adequate sample of charcoal from this feature has been submitted for radiocarbon dating. This is the third such sample from the Orient cemeteries. One date, approximately 950 B.C., has already been obtained from H. R. Crane of the University of Michigan Memorial-Phoenix Project Radiocarbon Laboratory.

In the greater New York area additional work has been done on the Pelham Boulder site. Julius Lopez, Stanley Wisniewski, and others, including students at Columbia University, have recovered an assortment of projectile points, predominately of imported rhyolite, various bone tools, and numerous potsherds. The Windsor and East River aspects are represented in different levels of the refuse. However, some of the artifacts, including pottery with curvilinear designs, evidently represent an undefined cultural unit.

Salvage operations are being conducted within New York City. At the Schurz site, Throgs Neck in the Bronx, Harry Trowbridge and Lopez excavated a flexed burial accompanied by a dog. The College Point site in Queens was mapped by Ralph Solecki, Martin Schreiner, and Timothy O'Leary. Two other sites threatened by destruction are also being investigated.

Near Lewiston, in Niagara County, Richard L. McCarthy has been excavating a site which appears to be that of the Joncaire Magazin Royal. This was built in 1720 by the French and burned in 1759. Early historic records indicate that the site contained a bark cabin measuring 30 by 40 feet within an enclosure (either a palisade or a picket fence). McCarthy's primary efforts were directed toward locating postmolds and he has found at least seventy of them. Many of these contained a quantity of charcoal. Some of the posts were 8 inches in diameter and had been set in flat-bottomed pits. At the time of this report an area 60 by 32 feet had been cleared and the completion of the excavations was planned. Clarence Lewis, Niagara County Historian, has been conducting the historical research.

The floor pattern of a Seneca structure was investigated by Alfred K. Guthe and Marian E. White for the Rochester Museum of Arts and Sciences. During a 6 week period, an area approximately 40 by 80 feet was stripped of topsoil and the subsoil checked for postmolds. The site involved was the Factory Hollow site near West Bloomfield in Ontario County. This site is judged to have been occupied between 1590 and 1615. Some 700 postmolds were recorded and 2 fire-reddened areas noted. Although no definite line of molds was discerned, there were 2 linear areas of multiple molds which may represent wall supports. These areas paralleled each other and were separated by a distance of 23 feet. These linear areas extended in an east-west direction and are thought to represent the sides of the structure. The east and west ends of the structure may be indicated, but not as definitely as the north and south sides.

The investigation of Iroquois sites in the Mohawk Valley has continued. Donald Lenig reports that he and Earl Casler have been excavating 2 sites in the Canajoharie area which yield pottery of early or transitional Iroquois types. In the St. Johnsville area, John Swart has been working on a Mohawk village site believed to have been occupied around 1550 to 1575.

PENNSYLVANIA. The Pennsylvania State Museum has been working with several members of the Lower Susquehanna Chapter of the Society for Pennsylvania Archaeology in excavating the Oscar Leibhart site at Long Level in York County. A hundred feet of postmolds have been uncovered in one trench and 34 feet of postmolds appeared 25 feet to the east. It is believed that this is a Susquehannock long house of the historic period, 1650 to 1675. Additional digging is necessary before the house and floor pattern can be confirmed.

John Witthoft reports that during the early 1930's Oscar Leibhart uncovered between 40 and 50 graves on this property. The grave materials were kept in Mr. Leibhart's private collection and were recently made available to Witthoft for study purposes. The majority of the trade beads are of the 1640 to 1660 period, while the pottery represents the Susquehannock pottery in its late degenerate form.

The Upper Ohio Valley Archeological Survey has completed its program with the expiration of the Sarah Mellon Scaife grant. The Section of Man, Carnegie Museum, Pittsburgh, plans to continue survey and excavation work in the Upper Ohio Valley as its major research project. This program will be conducted by Don W. Dragoo, Assistant Curator, Section of Man. Primary attention will be directed toward the content and distribution of paleo-Indian and Archaic manifestations. Recent excavations in the rock shelters of West Virginia have indicated new relationships which only further work will clarify.

Assembled by A. K. GUTHE

SOUTHEAST

ALABAMA. David L. DeJarnette, Archaeologist-in-Charge at Moundville, has been appointed a lecturer in the Department of Sociology and Anthropology at the University of Alabama. He teaches a course on Alabama archaeology during the spring quarter, 2 weeks of which will be devoted to test trenching at Moundville.

FLORIDA. Charles H. Fairbanks reports that the summer field session of Florida State University excavated in the ruins of the Spanish-Indian period Fort San Luis at the edge of Tallahassee. The objective of locating definable features of the fortification system was accomplished by finding the footing ditch for the palisade on the south, east, and north sides of the fort. The moat was sectioned on the south side and yielded considerable amounts of Indian ceramics, Spanish Majolica, and olive jar sherds as well as one piece of a brass cannon, probably a pedero. It is planned to continue excavations during the year to extend knowledge of the fortification system.

Florida State University survey activities during the summer included visits to areas of road construction planned for the near future, and attempts to locate the site of the Panton and Leslie Store, an important 18th century trading firm, and the village of the Creek prophet Francis, near St. Marks. These will be followed this year by an attempt to define the earlier Seminole material culture in northwest Florida. The anthropology department will also, in the coming year, investigate a large number of Fort Walton sites north of Tallahassee in order to define the settlement patterns around the large population centers and within the smaller villages. They

appear to fall within the time span of the Fort Walton culture, with sherd temper coming in rather late in the sequence. A recently located burial mound may fit into the late Weeden Island-Fort Walton transition.

The Florida State Museum is working on a long term salvage project which requires sporadic attention. A large Weeden Island II site in St. Petersburg is being gradually encroached on by a housing development. With the full cooperation of the contractor, habitation areas have been tested and data from the temple mound recorded as it was removed by machinery. In the near future, with the assistance of a large volunteer group including many members of the local chapter of the Florida Anthropological Society, work in a large burial mound will be initiated.

GEORGIA. A. R. Kelly reports further work in the area of Mound B, second largest of the mounds at Etowah. Another of the large saucer-shaped depressions, with peripheral postholes, was encountered. Fill in these pits, believed to have accumulated in situ, appears to place them in the Etowah II or III horizons. Evidence now available indicates that the final stage of Mound B Construction was in the relatively late Wilbanks period. The preceding construction level seems to have been Etowah IV.

Phillip E. Smith continued his survey of stone walls and mounds in North Georgia. A number of new structures were located and one of them tested. A summary report is being prepared by Smith and Kelly.

VIRGINIA. Archaeology has played a major part in assembling the historical data required for interpreting Jamestown to an estimated 3 million visitors in the 1957 celebration of the 350th anniversary of the founding of the first permanent English colony. Interpretation based on artifact and structural data, pictorial reconstructions, dioramas, and replicas of the first glass furnace and the first fort of 1607-1608 will provide insight into the lives of the settlers.

Records of tracts of land vaguely recorded and left to provide puzzles for generations of historians are now augmented by information from 96 ditches and 144 structures which are concrete evidence of boundaries and houses. One of the interpretative devices employed at various locations along the road circling the 3-mile long island is a series of paintings, mounted in weatherproof exhibits, which will interpret such scenes as the potter at his work, the cooper, a farmer and his helpers harvesting ice and storing it in a pit — all substantiated by archaeological evidence and 17th century references. Another device is the pictorial reconstruction of houses and house interiors, the result of observation of architectural details of excavated foundations, associated artifacts and, again, historical sources.

For the visiting public during the 350th anniversary celebration an illustrated booklet has been compiled by J. Paul Hudson, National Park Service museum curator and specialist in 17th century arts and crafts, in company with supervising archaeologist John L. Cotter. A comprehensive archaeological report on Jamestown, covering 22 years of exploration, has been started by Cotter and Edward B. Jelks, with Hudson's cooperation. Following the transfer of Jelks by the National Park Service to River Basin Surveys in Texas, B. Bruce Powell has joined the Jamestown staff to assist in compiling the report.

Following the Celebration Year, during which the Jamestown archaeological collection will be transferred to the museum facilities of the new Jamestown Visitor Center, the artifacts, with data, will be available to students of 17th century colonial history, arts, and crafts.

Assembled by W. H. SEARS

MIDDLE AMERICA

Although we have no reports of major new projects initiated last summer, data on 2 items mentioned in our last news are of sufficient general interest to merit an additional note.

The first item concerns 2 trips made by E. Wyllis Andrews in the winter of 1955-56 for the Middle American Research Institute. Late in 1955, he and Rosemary Andrews were guests of Loring M. Hewen of New York on a month's cruise along the Caribbean coast of the Territory of Quintana Roo, Mexico. Mr. Hewen's annual visits to the area over the last decade had resulted in the discovery of a number of hitherto unreported ruins, and the purpose of the present trip was a survey of coastal sites on the mainland and on Cozumel that would make the products of his unique experience in this area available to other scholars. The most interesting observation made at this time was on the extent of the ruins at Xcaret, on the mainland, almost directly opposite San Miguel Cozumel. A very large center of population was indicated here, and in February, 1956, the M.A.R.I. sent Andrews back for more intensive study of the site. Xcaret is one of the largest sites yet reported from the East Coast of the peninsula. The ruins are most dense around a small, well-sheltered harbor, but platforms and occupational debris between widely spaced temple structures extend at least 4 km. inland. In this area of roughly 20 sq. km., there are 22 groups of ceremonial structures, with some 60 partially standing vaulted buildings. The remains vary in construction and detail, though all are in the "East Coast" tradition. Unusual features are a thick precinct wall apparently never completed, twin temples on a single pyramid, 2 rectangular temples on round substructures, a round temple on a rectangular substructure, and several large caverns containing small but well-preserved ceremonial constructions. Several thousand sherds from trenches and surface collections were examined and classified in Merida by R. E. Smith of the Carnegie Institution of Washington. These show that Xcaret was occupied from a late Formative period correlative with the Chicanel of the Petén to early colonial times. Sherds found in building material give evidence of constructions contemporary to those of Mayapan, but wares of this period constitute less than 20% of the whole. The remains of a church and cemetery and pieces of Spanish olive jars are sufficient, in view of historical evidence, to identify the site as the Conquest period settlement of Polé, whence Montejo effected the subjugation of Cozumel. Most interesting is the suggestion that the archi-

tectural style characterizing the "Mayapan Period" in Northern Yucatán can be traced back to Classic period times on the coast of Quintana Roo. Figure censers similar to those of Mayapan, but made of slateware, indicate that other features of the late Postclassic culture of Yucatán may also have deeper roots in this area.

The second item of news comes from Stephan F. de Borhegyi, who with a group of students sponsored by the University of Oklahoma Faculty Research Council, assisted Gustavo Espinosa this summer in his work at Kaminaljuyú, where the Instituto de Antropología e Historia de Guatemala is proceeding with excavations. Major activities are centered on a large ball court of the "Palangana" type, known as Ball Court A, under which were found the remains of 3 buried structures dating back to the Early Classic period. A tomb underlying these constructions had not been excavated at the time of writing. Among the more interesting finds in this group was that of a long tenoned sculpture representing a jaguar, presumably of Late Classic date. Another major excavation was in Mound D-IV-2, which yielded a Late Preclassic tomb with rich mortuary furniture. New and important data on the earliest known Preclassic phase came from Las Charcas pits in which were found storage jars containing seeds and seed pods. Nearby were uncovered postholes indicating wooden constructions near the pits. All previously excavated pits had been filled with refuse and this indication of their use for storage opens new possibilities in the investigation of early dwelling sites.

Assembled by TATIANA PROSKOURIAKOFF

HIGHLAND SOUTH AMERICA

BOLIVIA. Manuel Liendo Lazarte, Director of the Museo Nacional Tiahuanaco, assisted by Gregorio Cordero, has recently made a survey of the ruins of Chocupercas. The Museum staff also excavated several sites in the Cuyahuani region. A hitherto unknown staircase of dressed stone was excavated at Tiahuanaco by members of the Comisión Arqueológica Boliviana which also carried out some work of conservation at the same site. Other recent excavations were made at several sites in the Department of La Paz — Yaurichambi, Moque, and Copancara — but details of the results are still lacking.

CHILE. Grete Mostny of the Museo Nacional de Historia Natural in Santiago reports the discovery of several chullpas near Toconce in the Atacama desert, a type of architecture which, so far, had not been known from Chile. She intends to begin work there early this year.

Staff members of the Museo Arqueológico de La Serena have carried out a series of surveys and excavations in the Huasco and Elqui valleys, and in the vicinity of Piritas, on the northern railroad, where several sites of the El Molle culture were found. Francisco L. Cornely, Director of the Musuem, reports the recent discovery of a preceramic site of the Shellfish culture at the inlet of Guanaqueros, some 45 km. to the south of La Serena, where large pressure-flaked projectile points, shell fishhooks, composite hooks, and bone harpoons were excavated. The Museum also took part in the explorations in the Salar de Atacama which were organized by the Anthropological Center of the University of Chile, and members of this group explored several coastal sites at Horcones, Quillota, and Chacabuco.

Father Gustavo Le Paige continued his work in the region of San Pedro de Atacama. Preceramic materials were collected from surface sites near the Salar de Atacama, and several test pits were excavated in pottery bearing deposits at the sites of Coyo, Solor, Tchapuchayna, Chekar, Beter, and Tocano. Jorge Iribarren, reporting on Le Paige's work, believes that the preceramic materials might eventually be correlated with the early horizon described for Argentina and Bolivia by Rex González and Ibarra Grasso respectively, while the ceramic cultures found by Le Paige seem to belong to different time levels, showing, in part, Tiahuanacoid and Incaic traits.

COLOMBIA. Carlos Angulo Valdéz of the Universidad del Atlántico, Barranquilla, has continued in 1955-56 his excavations in a number of midden sites on the western shores of the Magdalena river. Spanish contact materials and/or association with Tairona II sherds indicate protohistoric to historic occupation at most sites. In Malambo multiperiod occupation was observed, the lower strata containing pottery related to formative materials from the Sinú drainage.

Gerardo and Alicia Reichel-Dolmatoff of the Instituto Colombiano de Antropología spent several months in 1955-56 excavating in the Sinú valley. At San Nicolás, below Lorica, a surface accumulation of flint tools (scrapers, knives, but no projectile points) were found overlying eroded Tertiary rock. No association with pottery was observed. At Ciénaga de Oro a large midden site was excavated, containing among others, roulette-stamped pottery, several painted wares, biomorphic whistles, hollow cylindrical stamps, and a great number of hollow female figurines. The site represents probably a developmental stage following that of Momil II (see report in this issue). In the swamplands near Palmito another site was discovered where Momil II wares were found in association with irregular agricultural terraces and house mounds. In the vicinity of Maracayo, on the lagoon of Betancí, where in the early 16th century the Spaniards looted the famous burial mounds, several sites of major importance were excavated. House and burial mounds yielded materials corresponding to Bennett's "Sinú style," and to the intrusive complex found imbedded in Momil II, establishing thus their contemporaneity, and suggesting a recent protohistoric to historic occupation. Several shallow middens and urn burials were excavated near the mouth of the Sinú river as well as in the Canalete drainage to the west, and on the Gulf of Morosquillo to the northeast. Some of the sites belong to the Betancí period, while others show relationships with the cultures described by Linné for the Urabá area. Research in the Sinú region will be continued this year with the hope to establish a more detailed culture sequence for this area.

José Pérez de Barradas of the University of Madrid, Spain, who works under the sponsorship of the Banco de

la República in Bogotá, is preparing a new volume on the bank's collection of aboriginal Colombian gold work.

A small but modern archaeological museum was inaugurated in 1955 in Manizales, Department of Caldas. The 5000-odd objects are mostly donations or acquisitions from local collectors or huaqueros, lacking detailed documentation. Most of them represent the so-called Quimbaya style. Julio César Cubillos, who was in charge of the organization of the museum, is at present at the University of Popayan where he is reorganizing the local museum which contains some 2500 archaeological objects, many of them from his excavations on the island of Tumaco.

ECUADOR. Recent research has been limited mainly to the coastal region in the vicinity of Guayaquil (Provincia del Guayas, Río Daule) where Emilio Estrada and a group of local amateurs are undertaking an extensive survey of sites. Clifford Evans and Betty Meggers of the United States National Museum have returned to Ecuador for more work in the same area, and will stay until March working principally on sites which might provide further evidence for wider correlations on a formative time level.

Pedro Armillas has been sent to Ecuador by UNESCO in order to establish a systematic plan for the conservation and restoration of archaeological monuments, and to train a group of students in field techniques. He is working in connection with the Universidad Central where he is also lecturing.

PERU. The Chicago Natural History Museum 1956 Archaeological Expedition to Peru returned to the Museum early in August. Under the leadership of Donald Collier, Curator of South American Archaeology and Ethnology, the expedition completed 6 months of exploration and excavation in the Casma Valley. Collier was assisted by Donald Thompson of Harvard University. The expedition was made possible by a grant from the National Science Foundation.

Previous to the time of this expedition the Casma Valley had been one of the least known archaeologically of the coastal valleys. For this reason an attempt was made to study all parts of the valley to determine the number, character, and age of the prehistoric settlements and other ruins. Detailed studies, including mapping, photography, and the making of surface collections, were carried out at 53 sites, and test excavations were made at ten of these. Of particular interest were 2 large towns laid out in rectangular grid pattern, each covering nearly a square kilometer, dating from the Tiahuanaco period.

Louis M. Stumer has received a grant from the American Philosophical Society for field research in the Pativilca and Fortaleza valleys, at the extreme north of the Central Coast region. Stumer intends to determine the culture sequence for the area and, if possible, coordinate his findings with those of Donald Collier in the Casma valley to the desired end of relating Central and North Coast sequences.

Marshall T. Newman, Division of Physical Anthropology, United States National Museum, undertook excavation, as part-time work, at Hacienda Vicos, Marcará Valley, Callejón de Huaylas, from April to July, 1956. The year previously Federico Kaufmann D. had mapped the rock walls of a hilltop site locally known as Chopijerka, where Newman excavated several stratipits and then explored 8 subterranean rock-walled Recuay tombs and chambers. Surface sherds were collected as well. With the help of a field assistant provided by Louis M. Stumer, Newman excavated 4 more subterranean structures at a large site called Kikipampa on the puna. Surface sherds from this site suggest multiperiod occupation — some were Recuay, others Tiahuanacoid, others Chavín. Finally, sherds were collected at Bennett's site of Copa Chica. Clifford Evans intends to study all the ceramics as a supplement to Bennett's Callejón report.

A special committee, organized at the Universidad de San Marcos, is at present editing the posthumous work of Julio C. Tello. The first volume has already appeared, and refers to the archaeology of the Casma Valley.

Assembled by G. REICHEL-DOLMATOFF

LOWLAND SOUTH AMERICA

BRAZIL. Several rock shelters at Cerca Grande and Matazinhos, in the state of Minas Gerais, were excavated during July-September, 1956, by a group of archaeologists including Wesley R. Hurt, University of South Dakota; Luiz de Castro Faria and Carlos Paula de Couto, Museu Nacional, Rio de Janiero; Fernando Altenfelder Silva, Escola de Sociologia, São Paulo; and Oldemar Blasi and Gerson Danelli, Ministry of Education, Brazil. Cerca Grande is 40 miles north of Belo Horizonte, in the Lagoa Santa region. The caves are at the base of a large limestone cliff on the east border of a former lake. One of the shelters produced artifacts of quartz and quartz crystal in the upper level and another a few sherds. The lower levels of the deposits had not been investigated at the time of this report. Charcoal samples were collected from several sites with different cultural remains, and the radiocarbon dates should help to solve the problem of the antiquity of the preceramic cultures in this part of South America.

VENEZUELA. Irving Rouse and José M. Cruxent have spent several seasons in survey and analysis of ceramic materials from a large number of sites in northern Venezuela, with the goal of establishing a chronological framework. This work has resulted in the identification of new complexes and the expansion of the known distribution of some of those previously reported. During the course of the survey, 25 charcoal samples were collected for dating at the Yale Geochronometric Laboratory. The monograph presenting the results of this investigation is nearing completion.

Assembled by BETTY J. MEGGERS

TRIBUTES TO A. E. DOUGLASS

During the annual meeting of the American Anthropological Association, December, 1956, at Santa Monica, California, Professor Emeritus Andrew E. Douglass of the University of Arizona was cited for his role in the development of archaeology. Official letters by President Emil W. Haury of the American Anthropological Association and by President William A. Ritchie of the Society for American Archaeology were read; later in Tucson Haury delivered the letters in person to Douglass, who had been unable to attend the Santa Monica meeting.

The letters from the 2 organizations follow:

The American Anthropological Association salutes you at this time for the vital contribution that you, an astronomer, have made to American archaeology.

Your vision led to the study of tree-rings as a means of evaluating solar effects on the earth's climate. Out of this quest, keen foresight introduced the use of architectural timbers, preserved in the ruins of the southwestern United States, as a means of extending the tree-ring chronology beyond the capacity of living trees. It was at this point that archaeology became the beneficiary of its most meaningful and helpful legacy, a tool for measuring time. The successful application of the techniques you devised for reading one of nature's time clocks has not only supplied the archaeologist, especially in the Southwest, with a reliable chronological framework, but it has introduced new ideas about climate and its effect on people, and re-evaluations of culture growth.

Had it not been for your eagerness to work so wholeheartedly with the archaeologist, and had you felt less keenly his need to solve dating problems, the tremendous advantage now enjoyed by the profession would not have materialized. The interdisciplinary collaboration manifested in the development of tree-ring studies has been exemplary and of the highest type.

In recognition of this unselfish cooperation, often at the expense of personal interests, of the inspiration you have given and most of all for your lasting contribution to archaeology, the American Anthropological Association pays tribute to you and voices its profound thanks and respect.

* * * * *

On behalf of the Society for American Archaeology I am happy to convey to you this expression of the esteem and gratitude of the archaeologists of this country for the unique and inestimable contribution of your work in dendrochronology, by means of which the Southwestern United States has the most precisely dated prehistory in the world. Your ingenious discovery of this method of exact dating has brought to this large and important segment of New World archaeology a systematic ordering of events which is the envy of those of us whose investigations have been devoted to areas of "complacent trees" and nonexistent wood specimens.

Not only have you equipped workers in our field with a system which furnishes age reckoning for sites and cultures to the very year, but one which also supplies tree-ring information concerning climatic conditions during the periods represented by the archaeological record. Thus the key to the abandonment by the Anasazi of the San Juan drainage area is almost certainly to be found in your determination of the long period of severe drought during the last quarter of the thirteenth century, or between A.D. 1276 and 1299, in the amazing exactitude of your dramatic method.

Such information brings to the student of "old, forgotten, far-off things," a vitalizing insight whereby his lifeless relics become invested with understandable human need and purpose; in short, his academic findings are translatable into historical configurations with temporal continuity and ecological rapport. This humanizing of archaeology is a high-level achievement toward which the professional prehistorian aspires and, for the Southwest at least, your singular contribution has been of the foremost importance.

The Society for American Archaeology takes pleasure in thus acknowledging your great contributions to its field, and in extending to you on this occasion its cordial regards and well wishes.

1957 ANNUAL MEETING OF THE SOCIETY

The annual meeting of The Society for American Archaeology will be held on the campus of the University of Wisconsin at Madison May 2-4, 1957. It is to be held in conjunction with the annual meeting of the Central States Anthropological Society and a special session of this group has been planned jointly with The Society for Applied Anthropology. The local Wisconsin Archeological Society has also been invited to hold its annual meeting at Madison on May 4. Inexpensive accommodations will be available in the short course dormitories of the University.

A feature of the meeting period will be an exhibition of Hopewell archaeology to be held in the galleries of the State Historical Society of Wisconsin, located on the campus. It is hoped the exhibition will provide a scientific resource for a comparative study of the Hopewell culture in the sessions of the Society. The joint session with the CSAS also provides an opportunity for a common ethnological, ethnohistoric and archaeological approach to such culture complexes as Oneota.

Titles of papers to be presented at this meeting and brief abstracts must reach the Program Chairman on or before March 1, 1957. Send titles and abstracts to David A. Baerreis, Sterling Hall, University of Wisconsin, Madison 6, Wisconsin.

David A. Baerreis, Department of Sociology and Anthropology, University of Wisconsin, will be in charge of program and arrangements for the S.A.A. Andrew H. Whiteford, Department of Anthropology, Beloit College, will be in charge of the C.S.A.S. program.

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HEIZER, R. F. AND FRANKLIN FENENGA
1939 Archaeological Horizons in Central California. *American Anthropologist*, Vol. 41, No. 3, pp. 378-99. Menasha.

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